



**Radial Cement Bond
Variable Density Log
W/ Temp/GammaRay/CCL**

Company Antero Resources
Well Harpua 2H
Field Rabbit Ears
County Tyler
State West Virginia

Company Antero Resources
Well Harpua 2H
Field Rabbit Ears
County Tyler State West Virginia

Location: SEC N/A TWP N/A RGE N/A
Permanent Datum Ground Level Elevation
Log Measured From Kelly Bushing 25' A.P.D.
Drilling Measured From Kelly Bushing
API #: 47095026410000
Other Services N/A
Elevation
K.B.
D.F.
G.L.

Date	2-May-2020	
Run Number	One	
Depth Driller	22,521 ft.	
Depth Logger	6,750 ft.	
Bottom Logged Interval	6,750 ft.	
Top Log Interval	Surface	
Open Hole Size	n/a	
Type Fluid	Freshwater	
Density / Viscosity	n/a	
Max. Recorded Temp.	158 deg F	
Estimated Cement Top	3,886 ft.	
Time Well Ready	07:00	
Time Logger on Bottom	11:10	
Equipment Number	132	
Location	Marietta, Ohio	
Recorded By	Tom Weese	
Witnessed By	Chris Young	
Borehole Record		
Run Number	Bit	From To
Tubing Record		
Run Number	Size	Weight From To
Casing Record		
Surface String	Size	Wgt/Ft Top Bottom
ProL String	13 3/8 in.	54.5 # Surface 477 ft.
Production String	9 5/8 in.	36 # Surface 2,614 ft.
Liner	5 1/2	23# Surface 22,521 ft.
Marker Joint		5,666 ft. 5,676 ft.

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All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretation, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages, or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our general terms and conditions set out in our current Price Schedule.

Comments

Primary Log on Well
Log Correlated to Marker Joint at (5,666' - 5,676')
Depth Correction (-2)
Main Pass 0 PSI
Repeat Pass 0 PSI
Thank You For Using Nine Energy Wireline of Marietta, Ohio

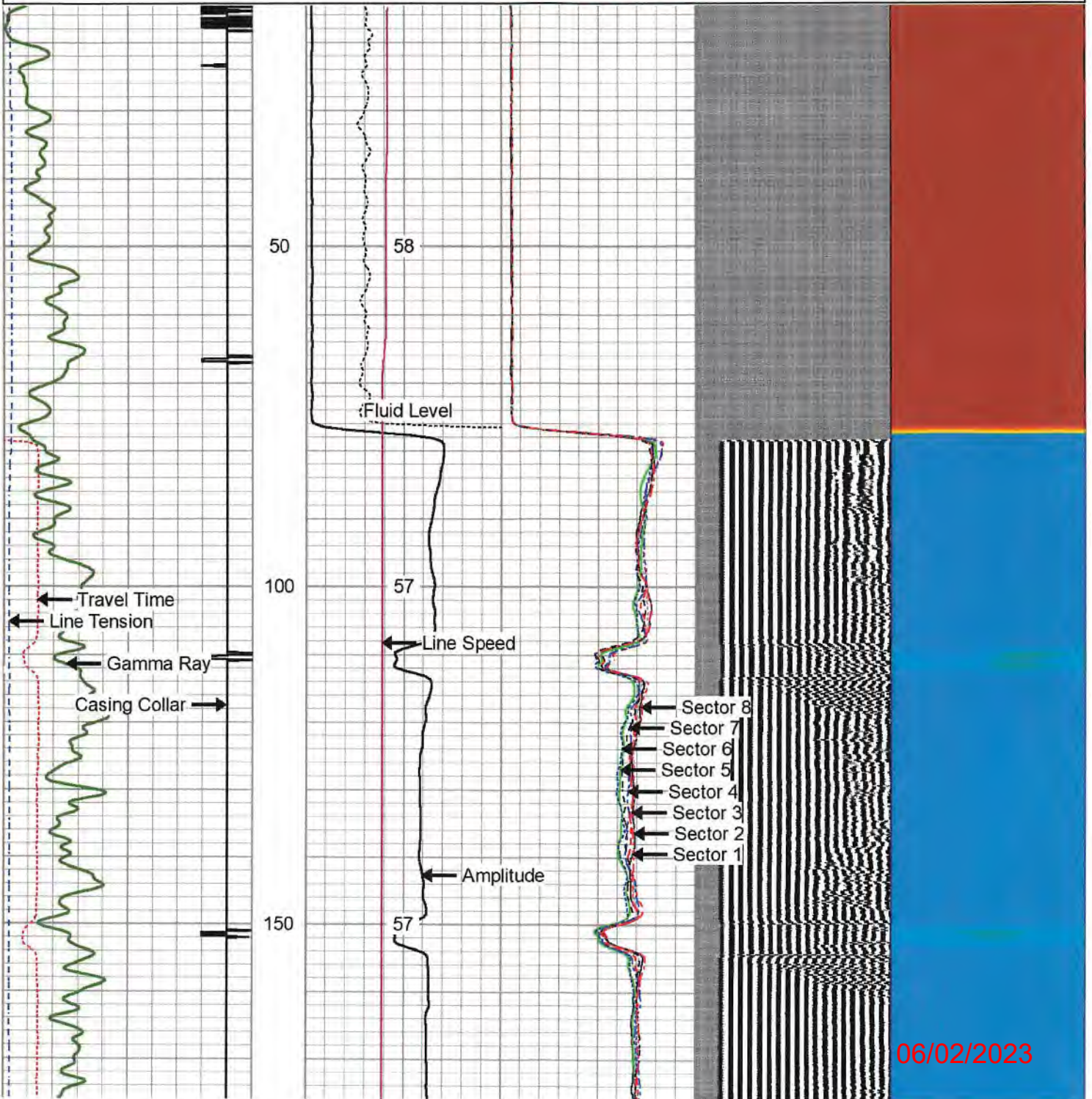
RECEIVED
Office of Oil and Gas
APR 03 2023
WV Department of
Environmental Protection



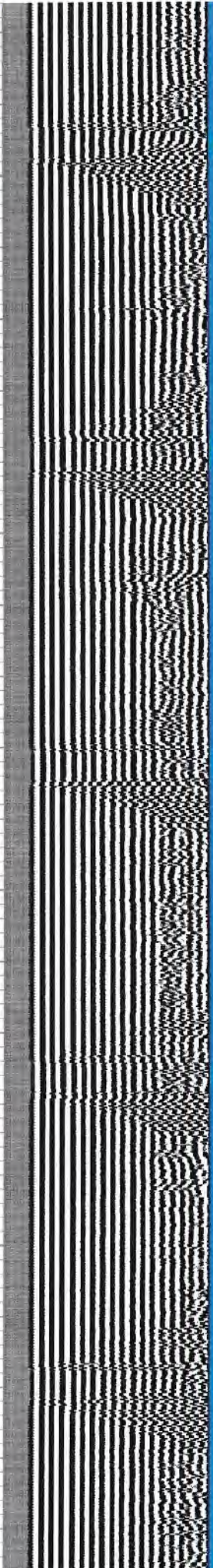
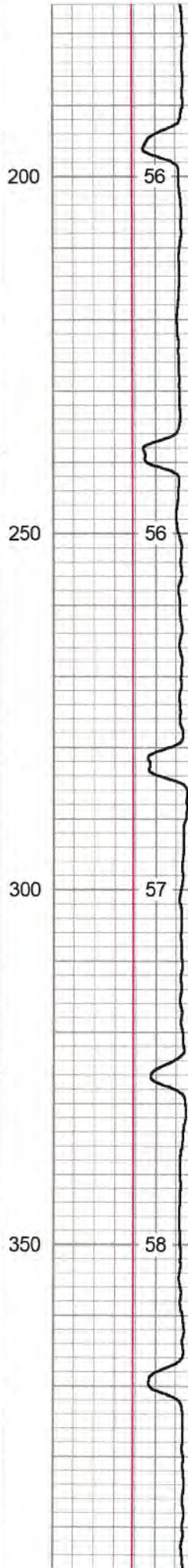
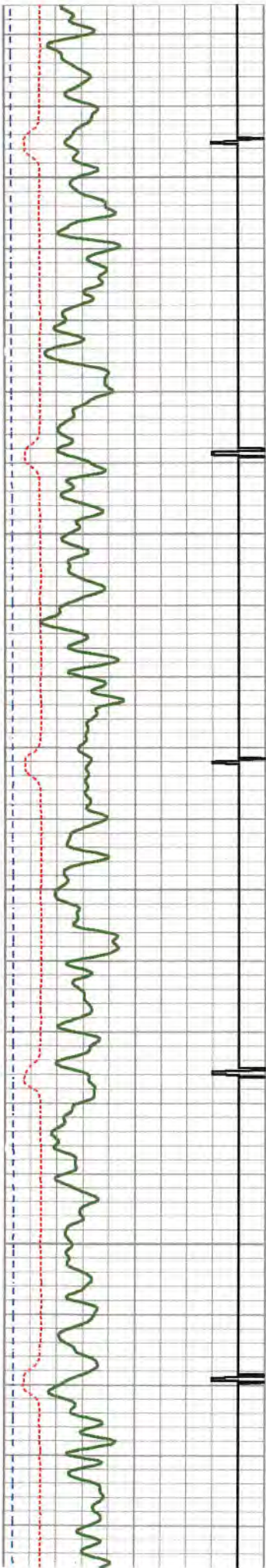
Main Pass 0 PSI

Database File antero_gamehengeeast_harpua2h_rcbl_nineenergy_may_2_2020.db
 Dataset Pathname Rabbit_Ears/Harpua_2H/RCBL_1/pass5.5
 Presentation Format 9rcbl
 Dataset Creation Sat May 02 12:29:41 2020
 Charted by Depth in Feet scaled 1:240

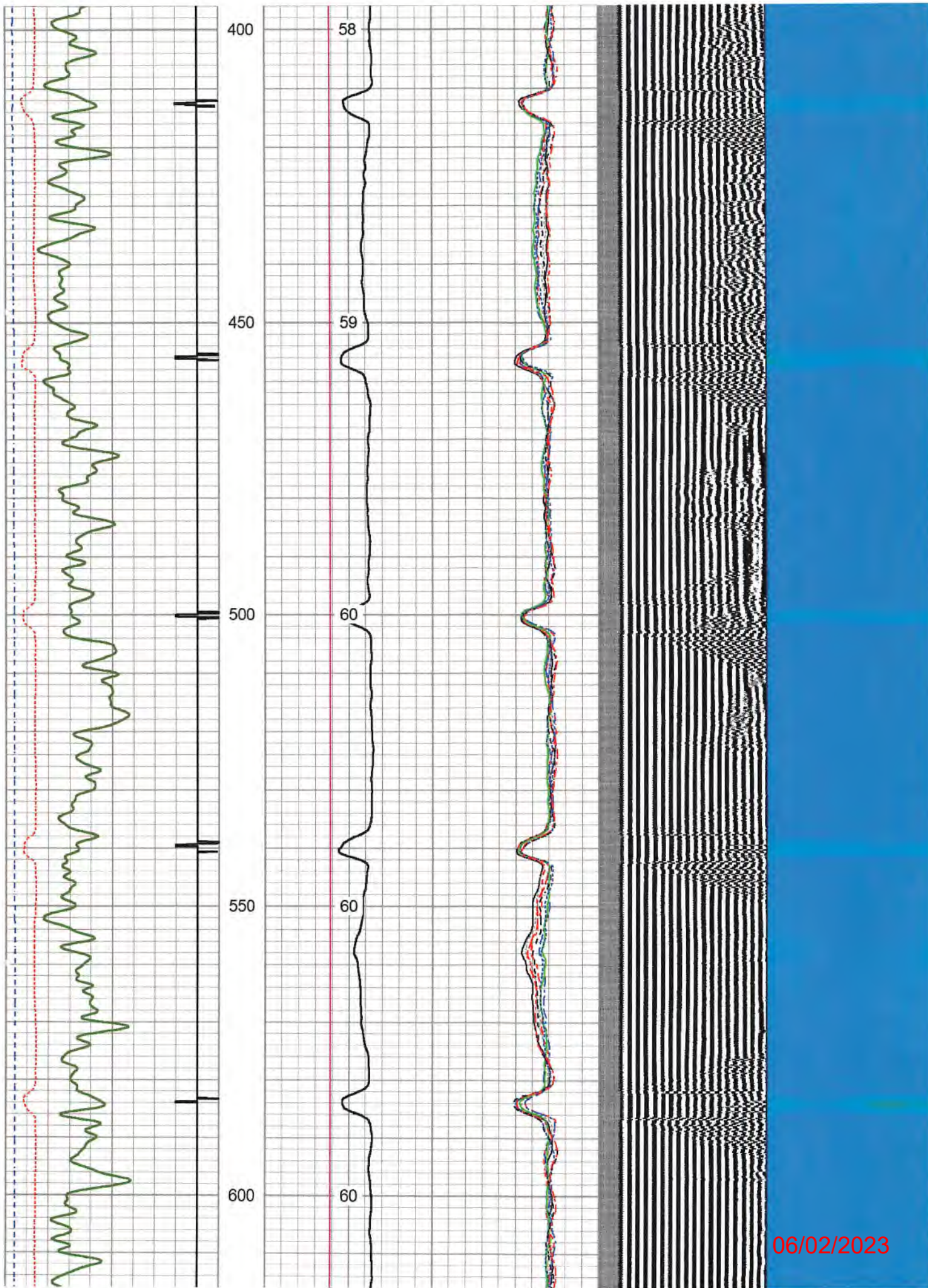
270	Travel Time (usec)	200	0	Amplitude (mV)	100	-5	Sector 1	150	Variable Density	1	Cement Map	8
9	Casing Collar	-1		Amplified Amplitude		-5	Sector 2	150	200	(usec)		
0	Gamma Ray (GAPI)	150	0	(mV)	10	-5	Sector 3	150				
0	Line Tension (lb)	5000		Line Speed		-5	Sector 4	150				
			-500	(ft/min)	500	-5	Sector 5	150				
				TEMP		-5	Sector 6	150				
				(degF)		-5	Sector 7	150				
						-5	Sector 8	150				

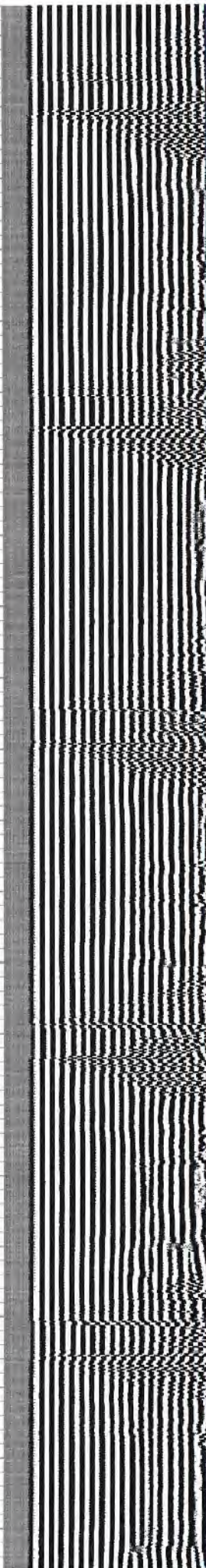
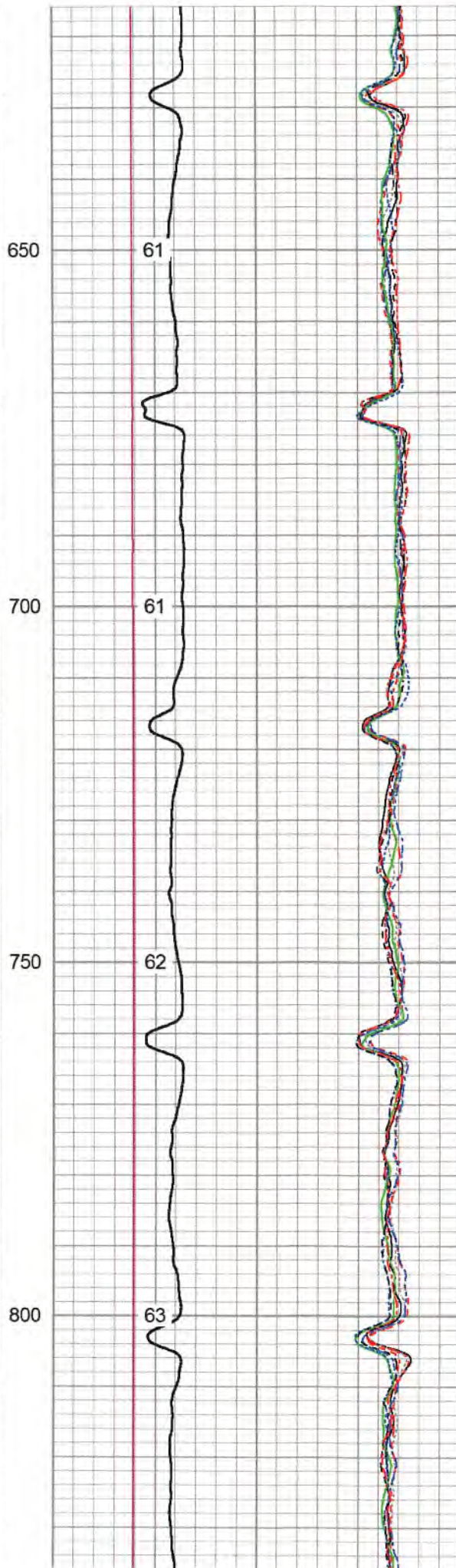
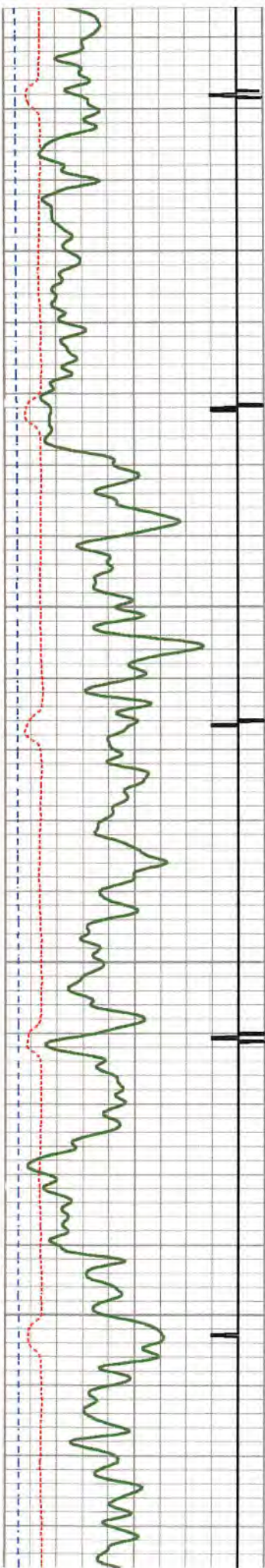


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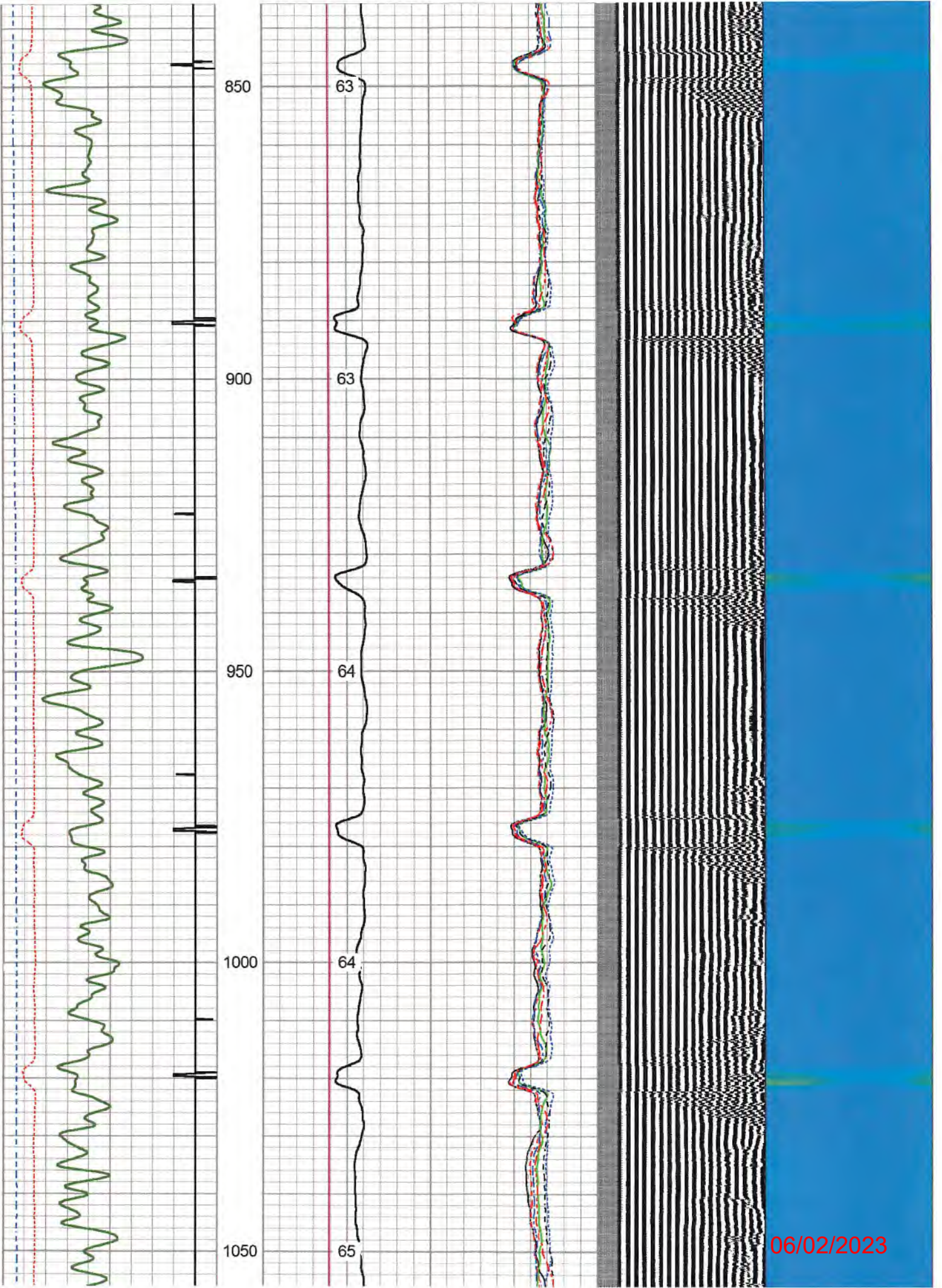


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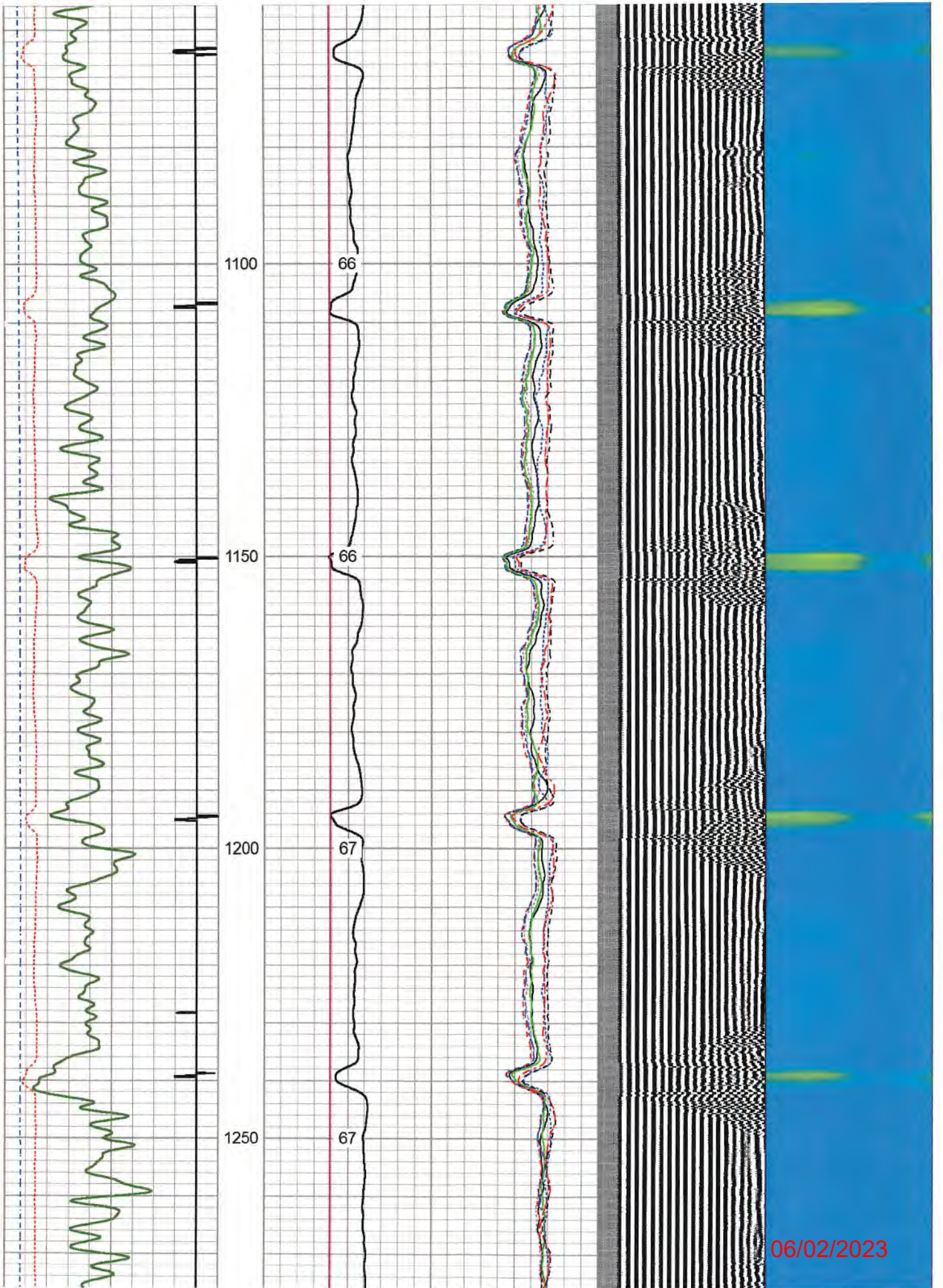




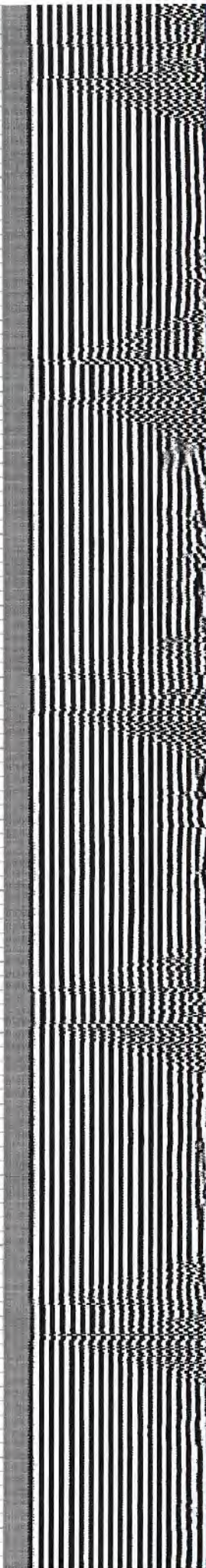
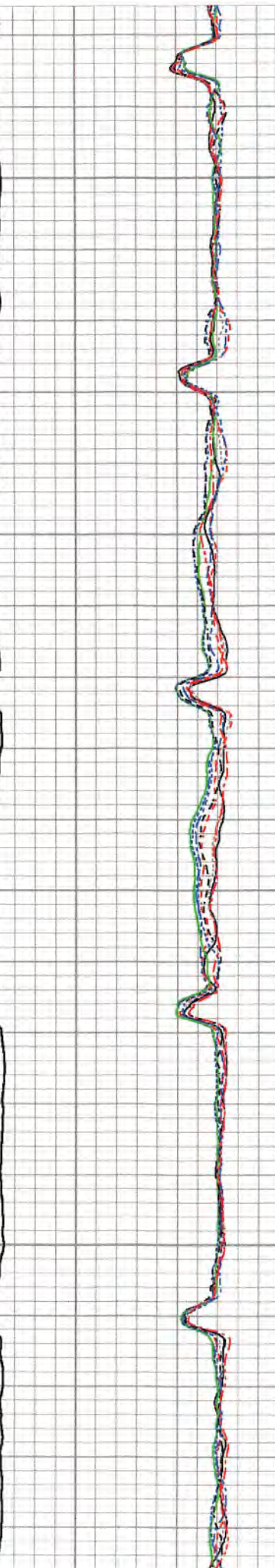
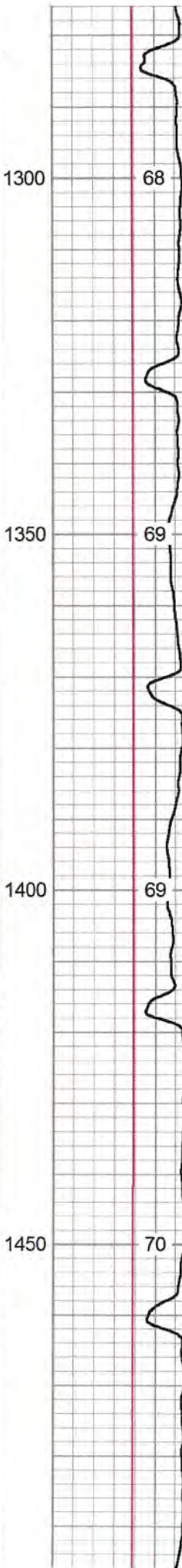
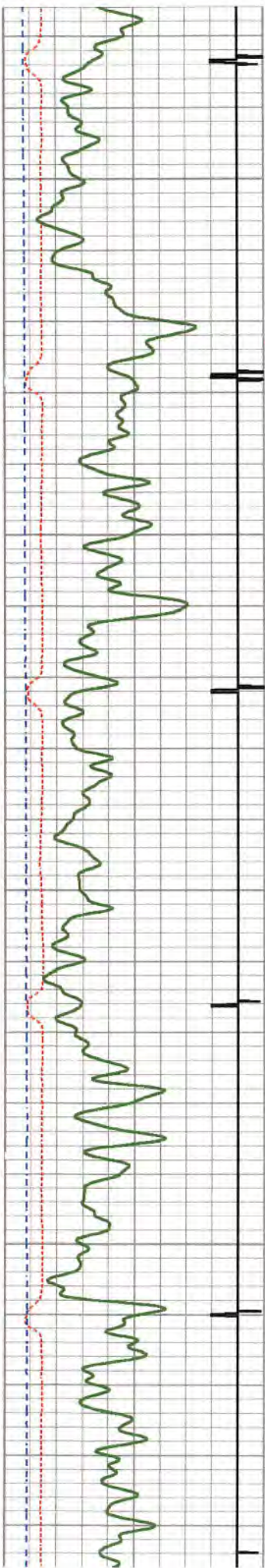
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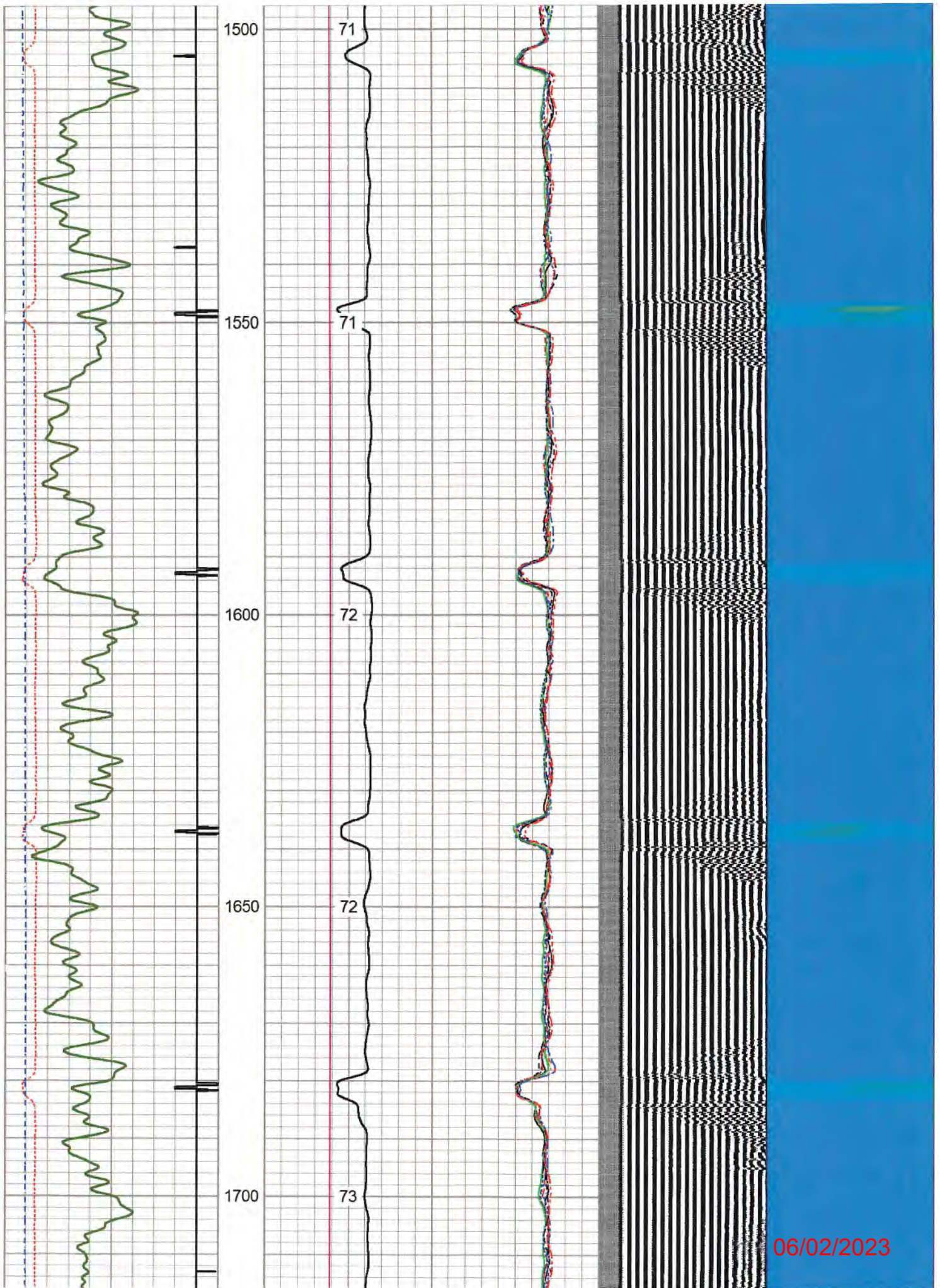
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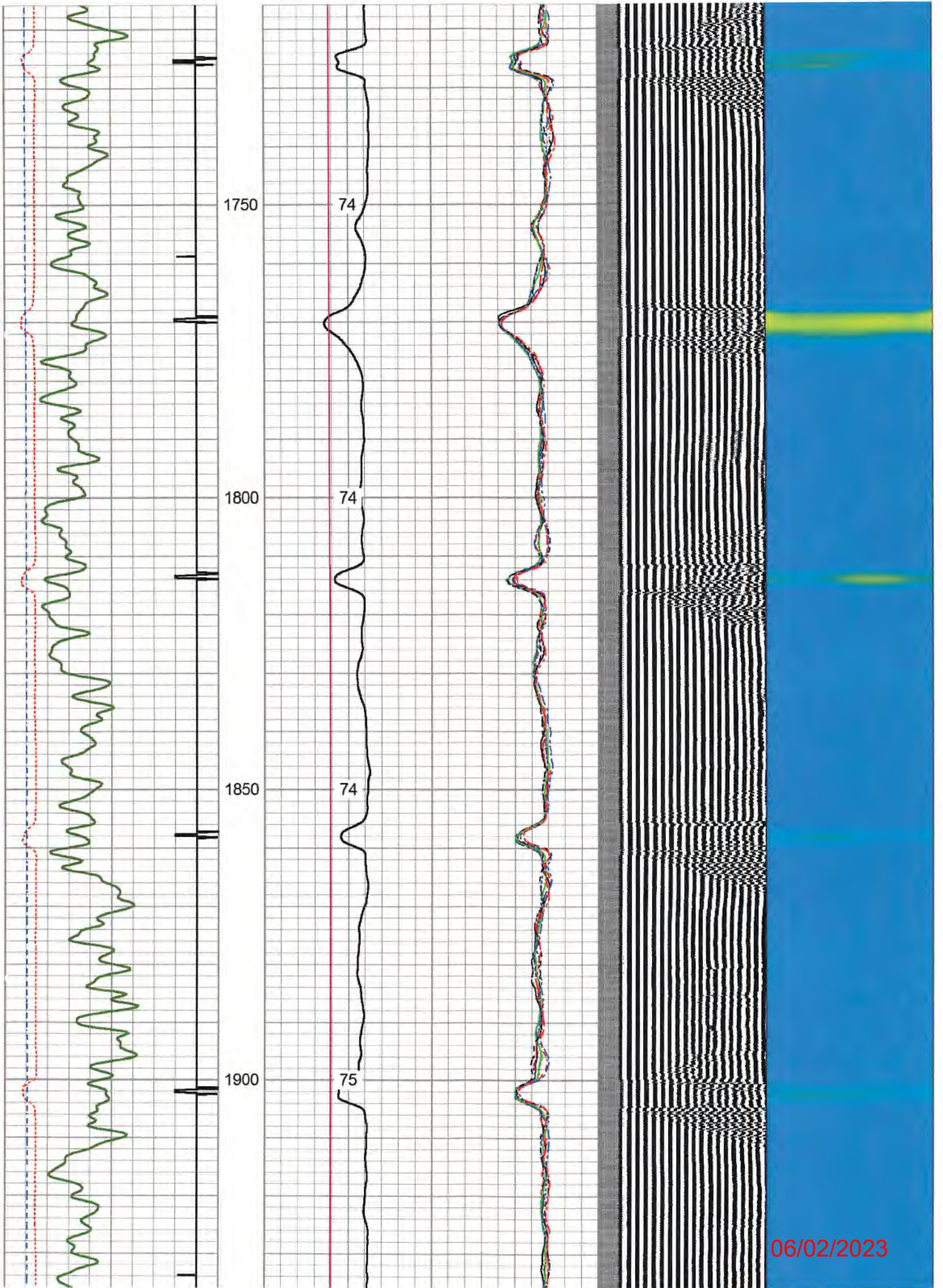


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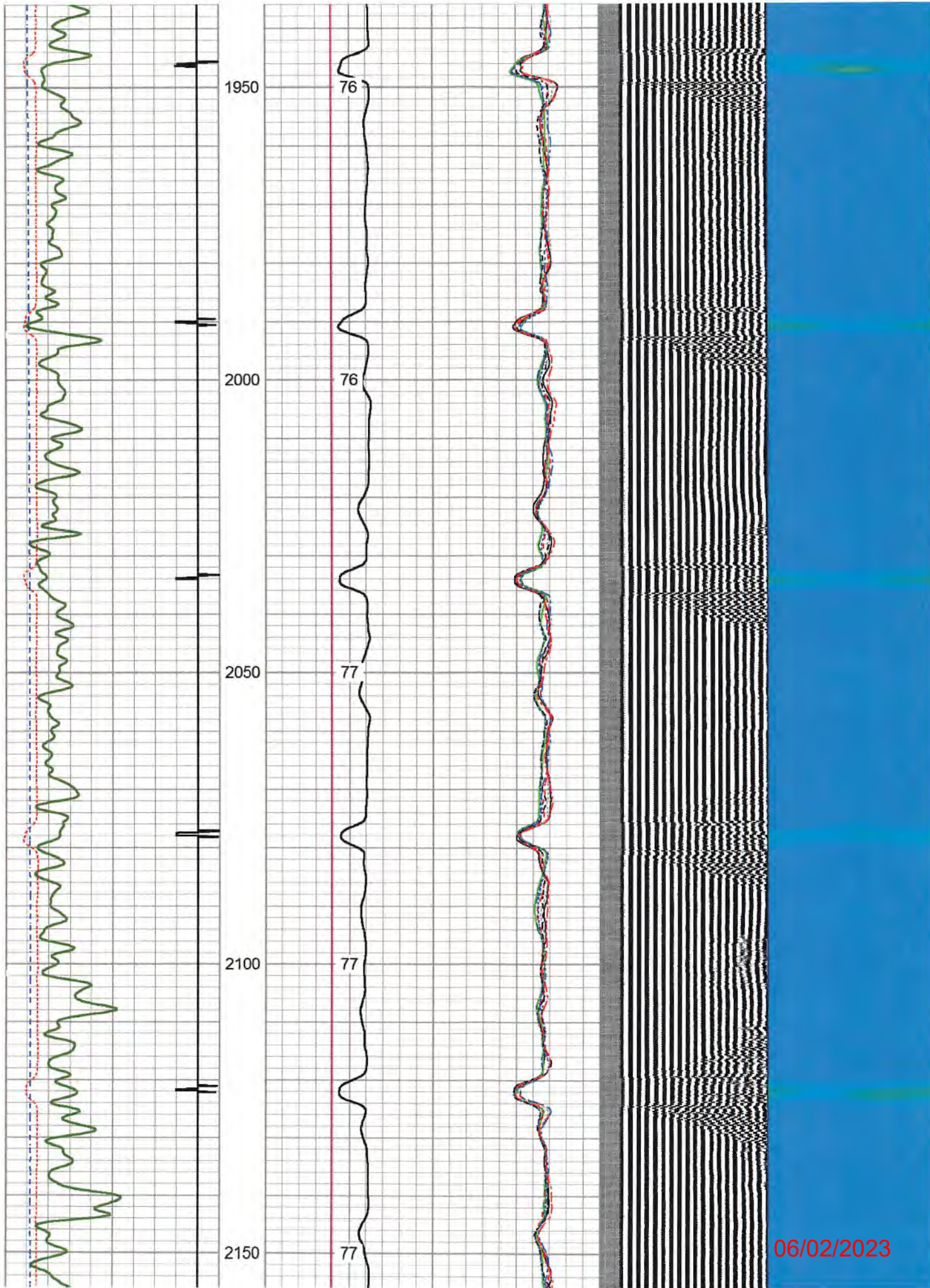


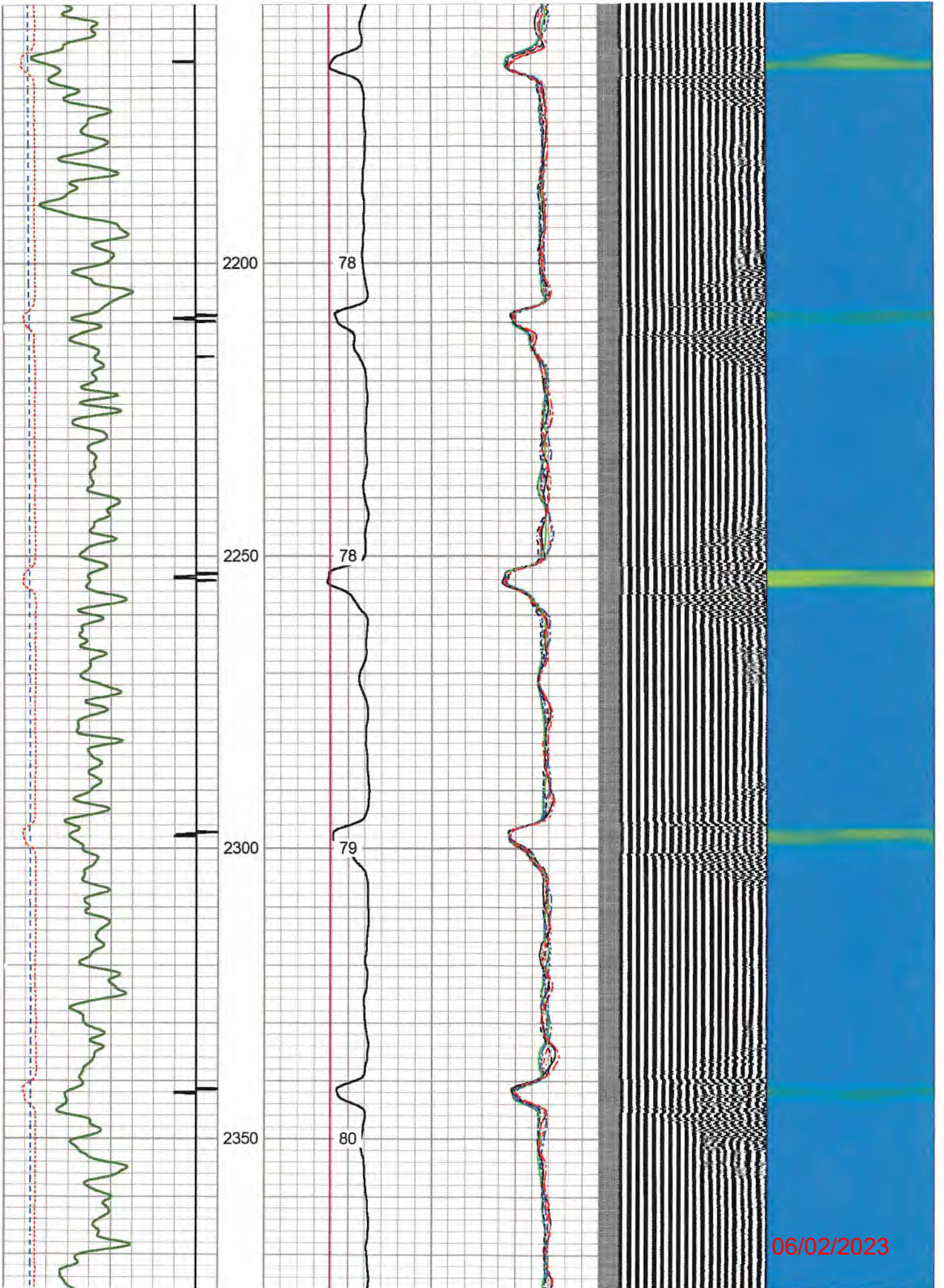
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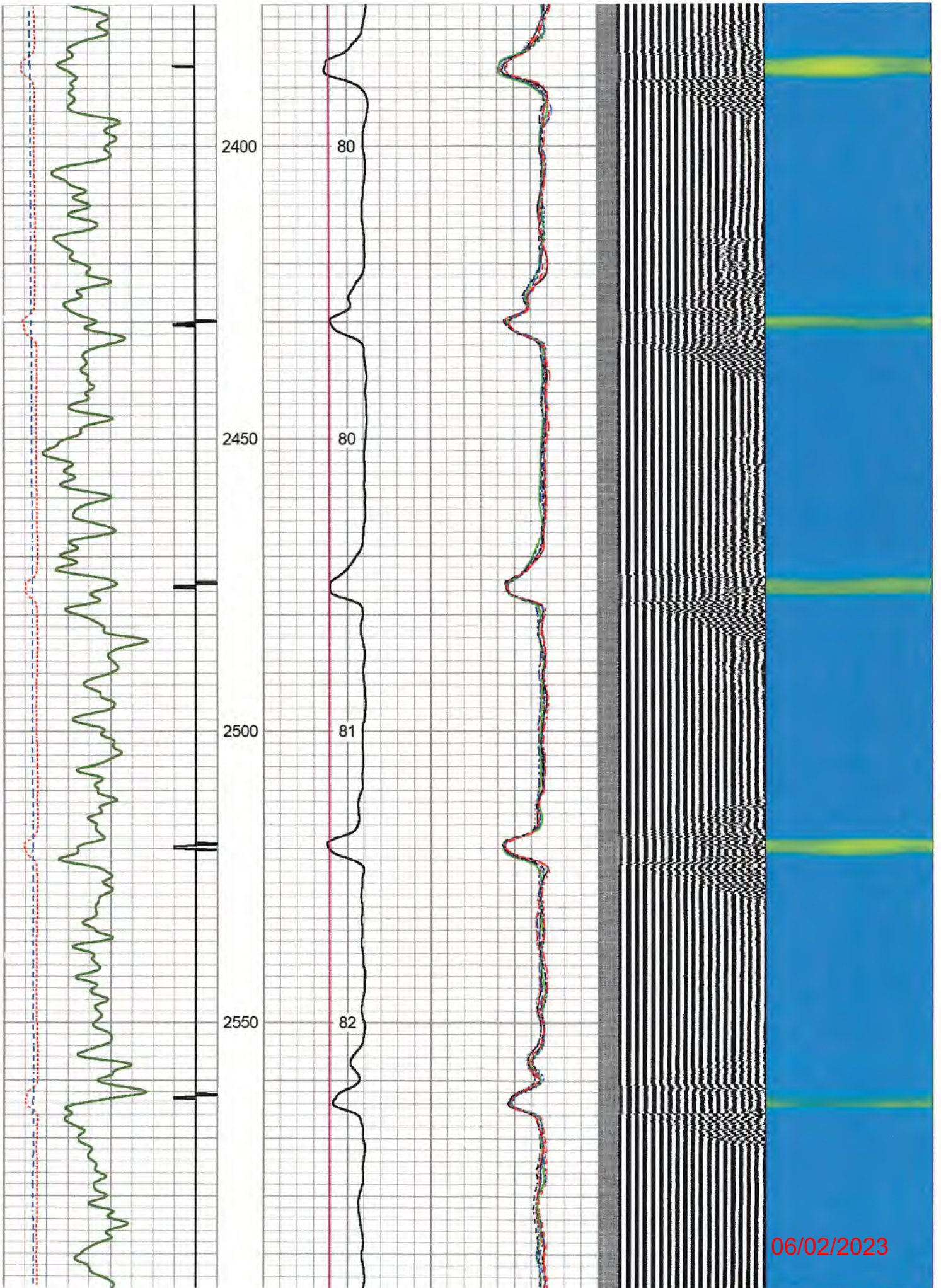


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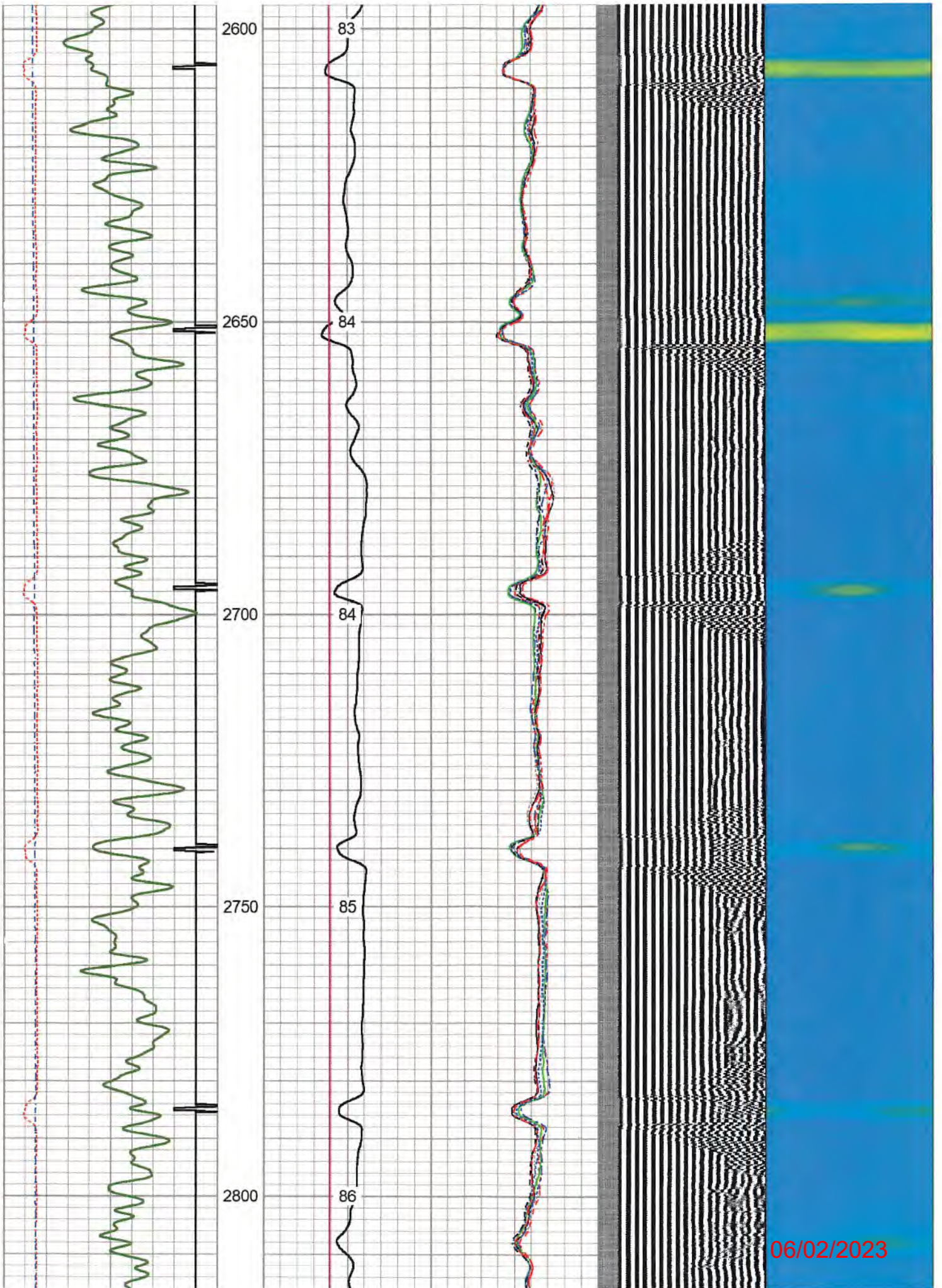




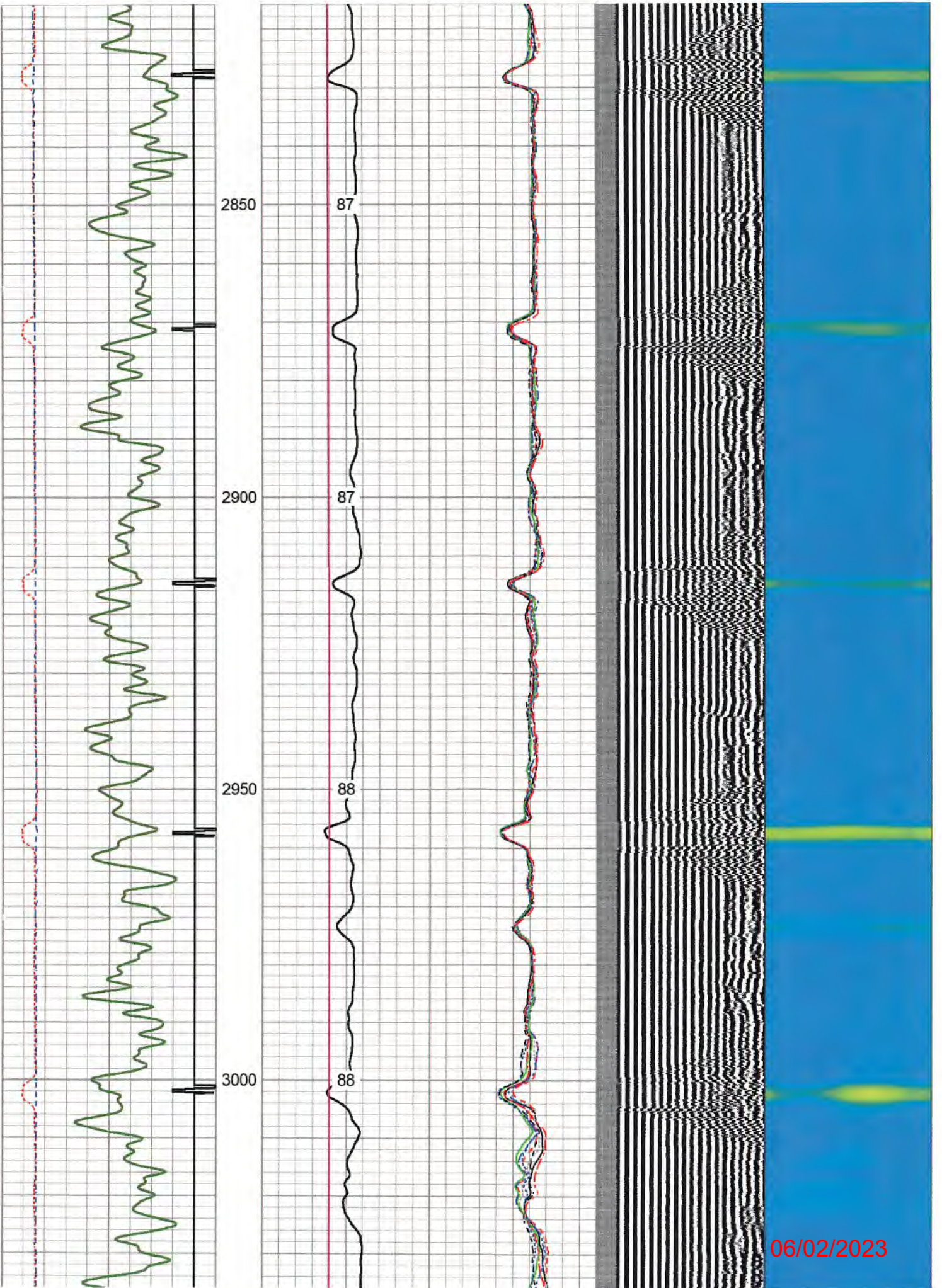
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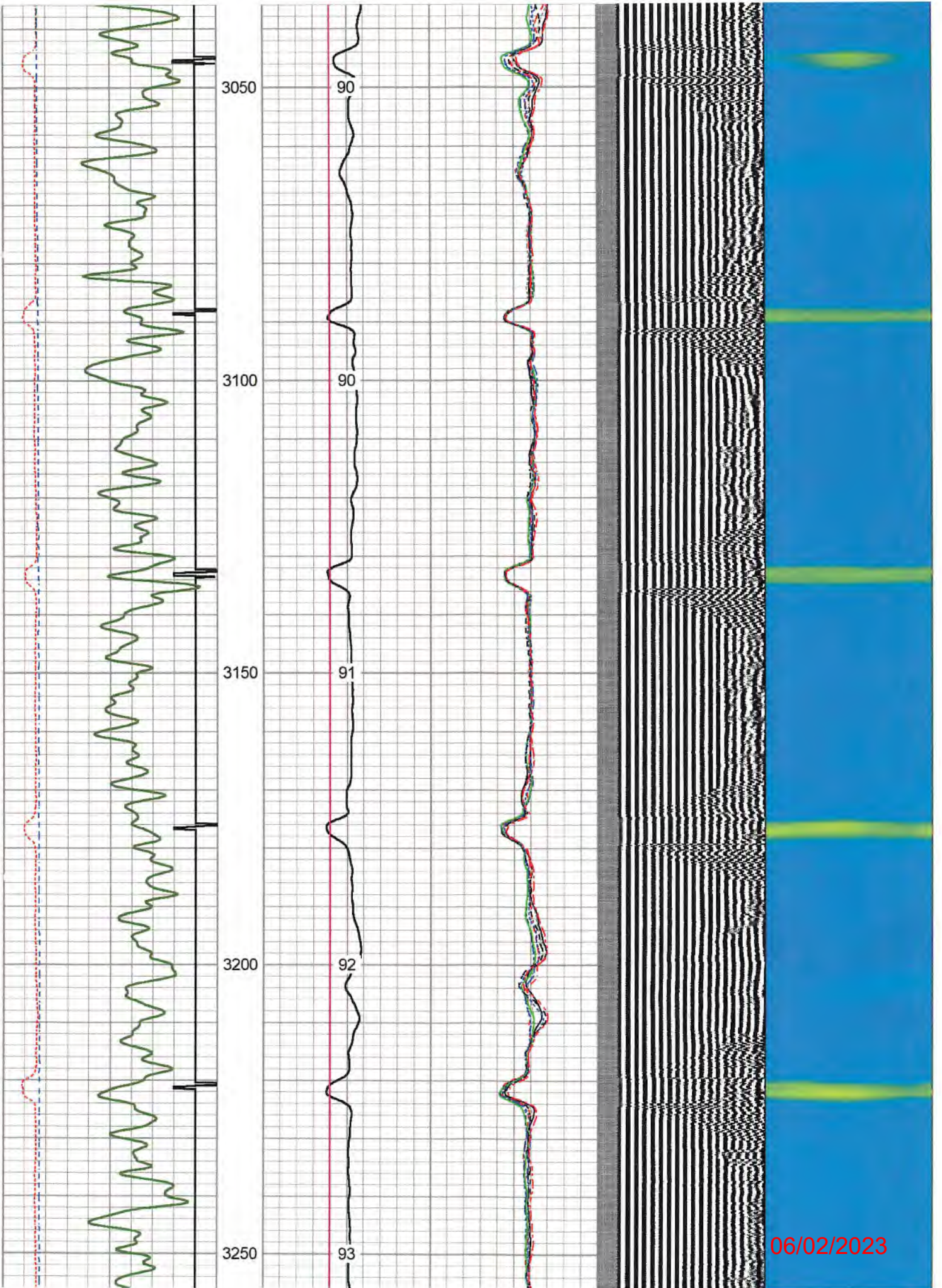
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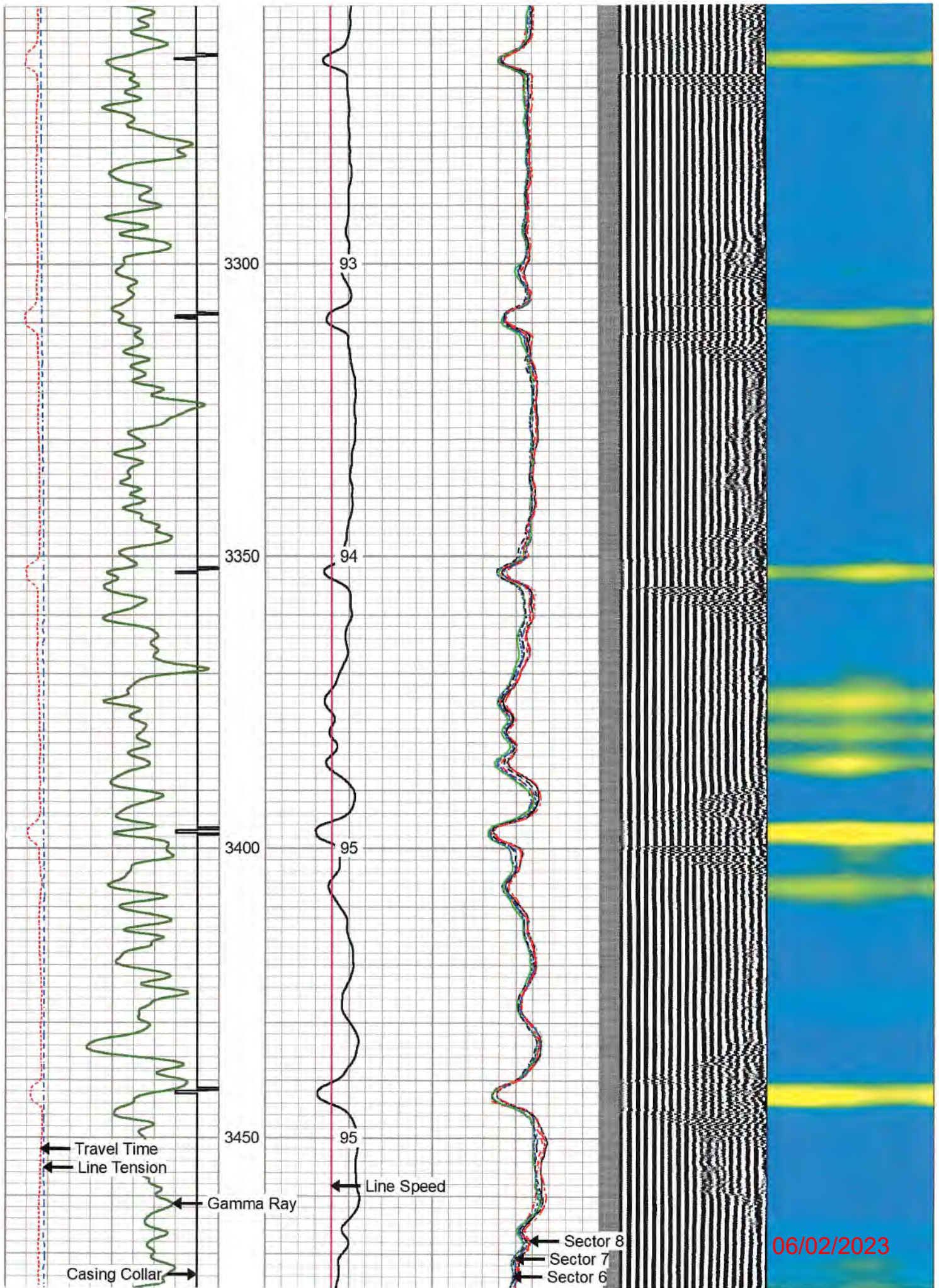
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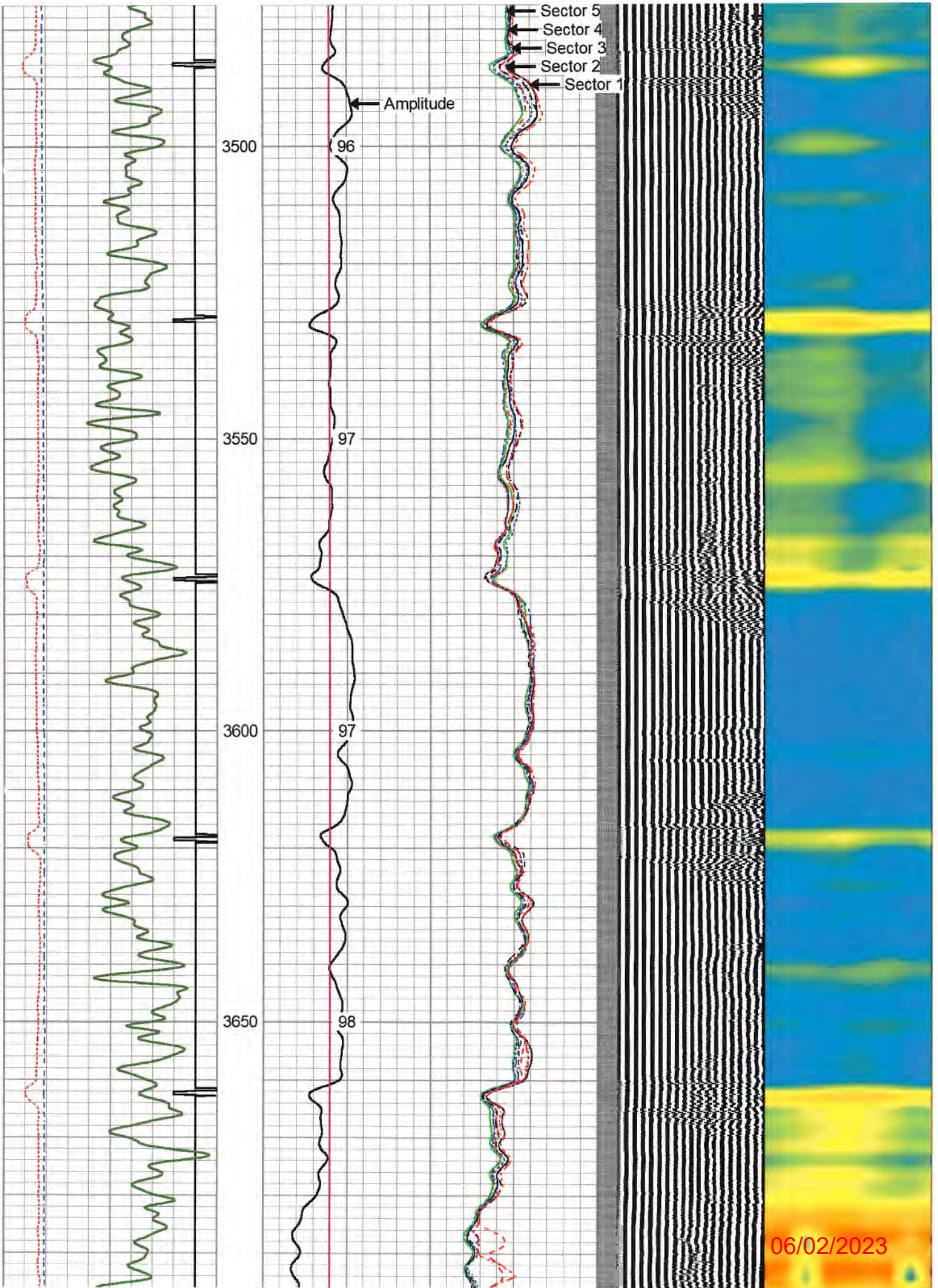


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3500

3550

3600

3650

96

97

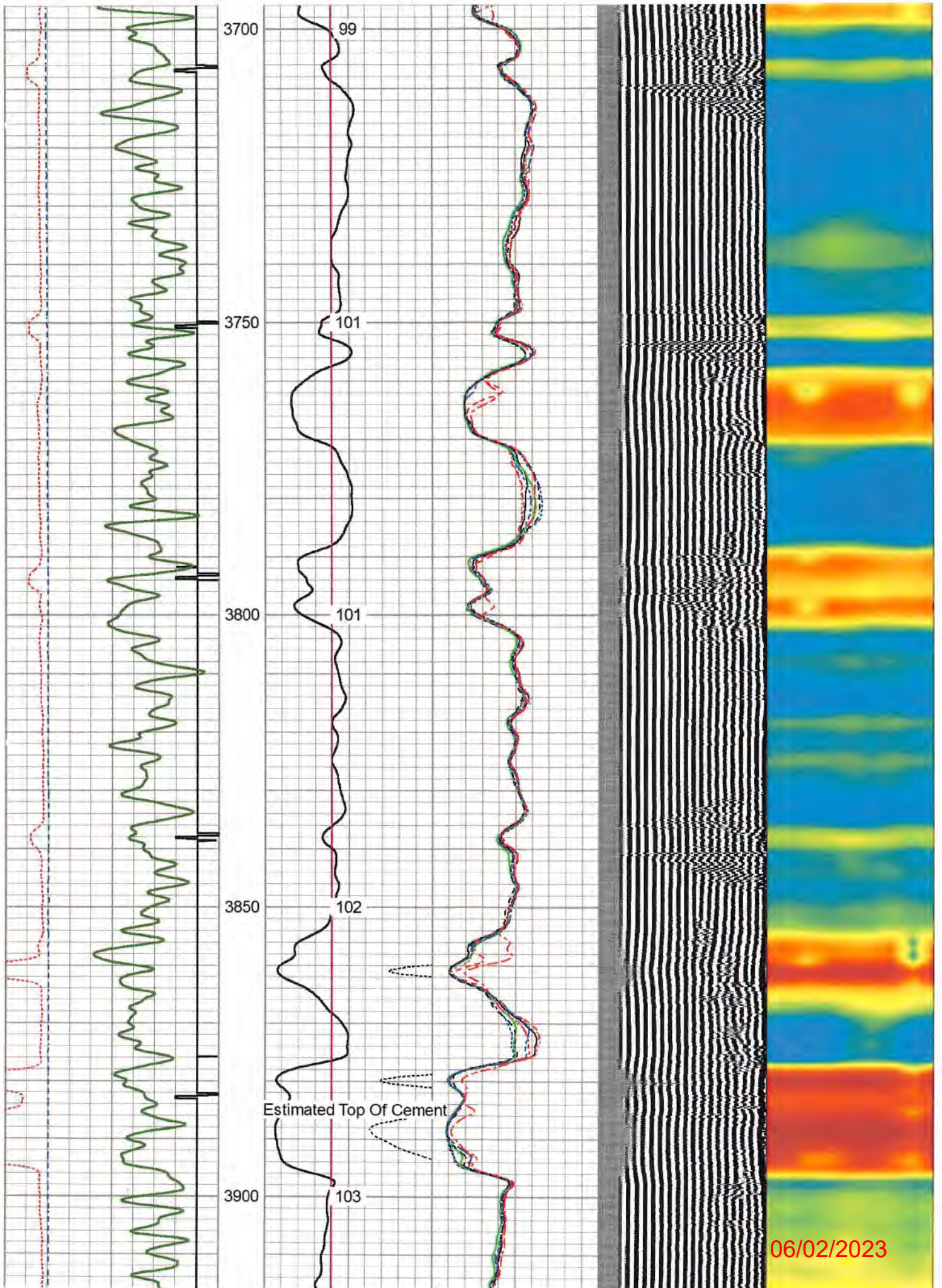
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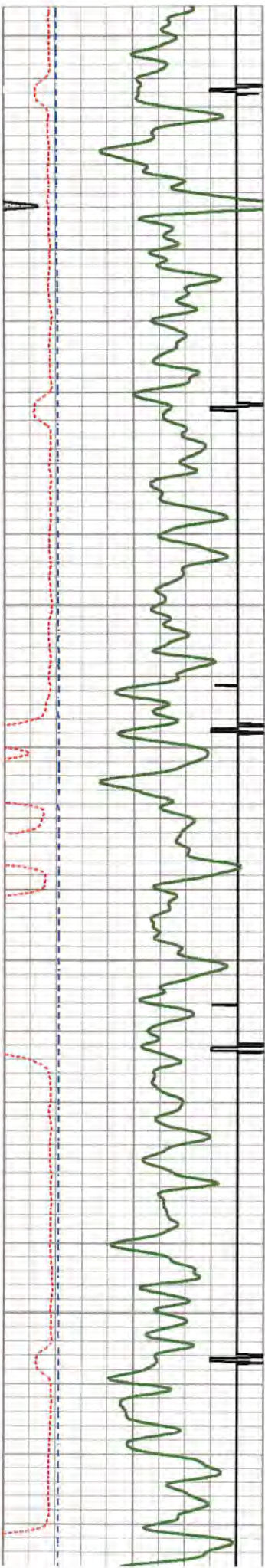
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Amplitude

Sector 5
Sector 4
Sector 3
Sector 2
Sector 1

06/02/2023





3950

4000

4050

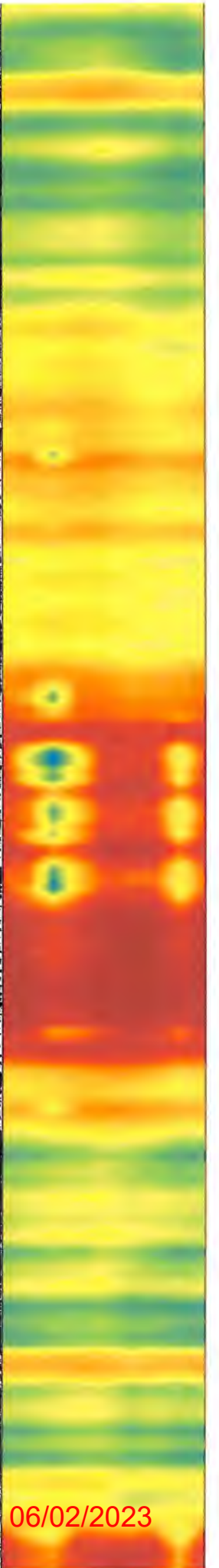
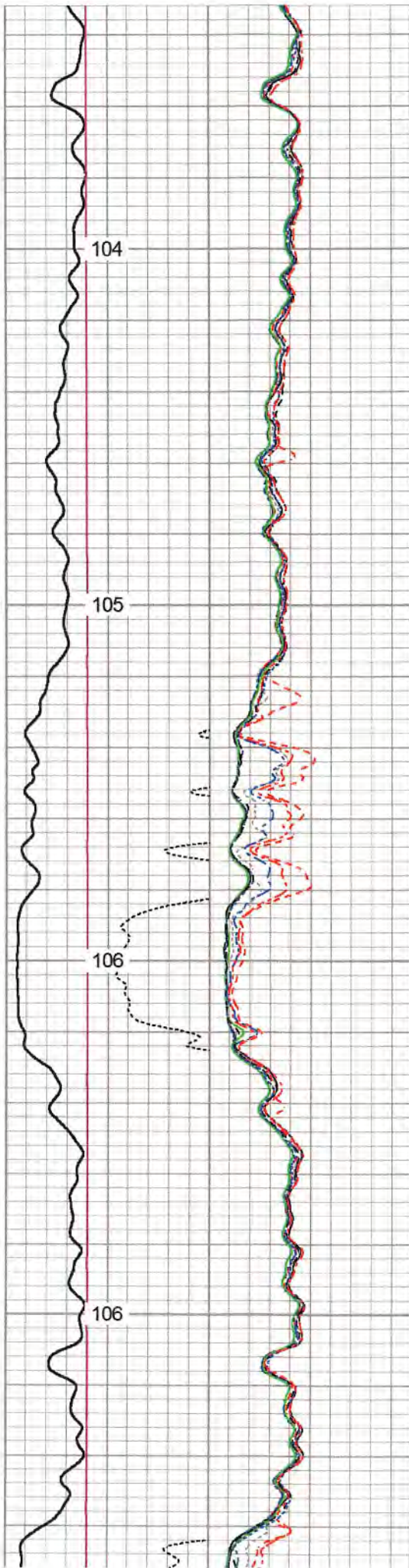
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104

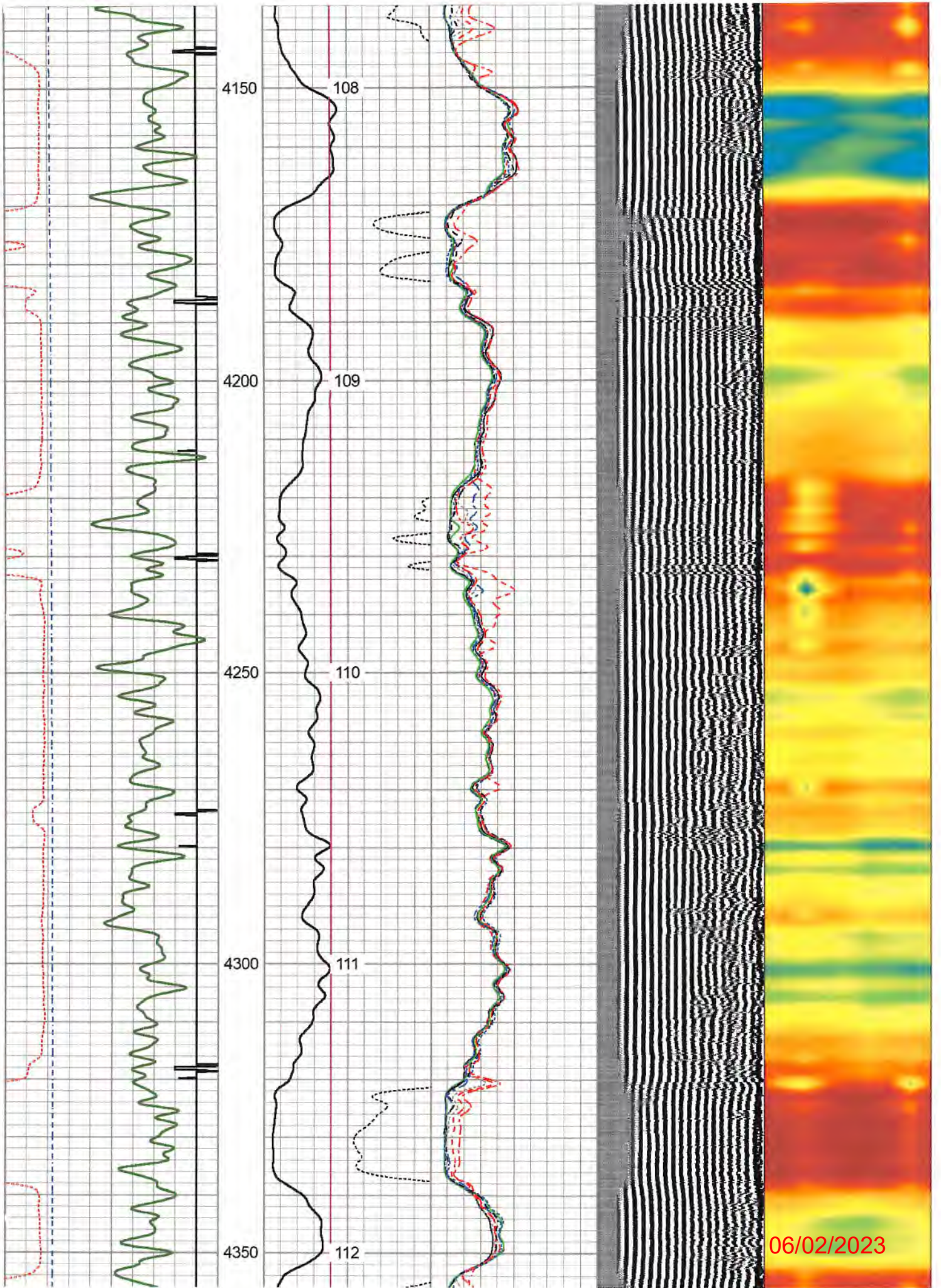
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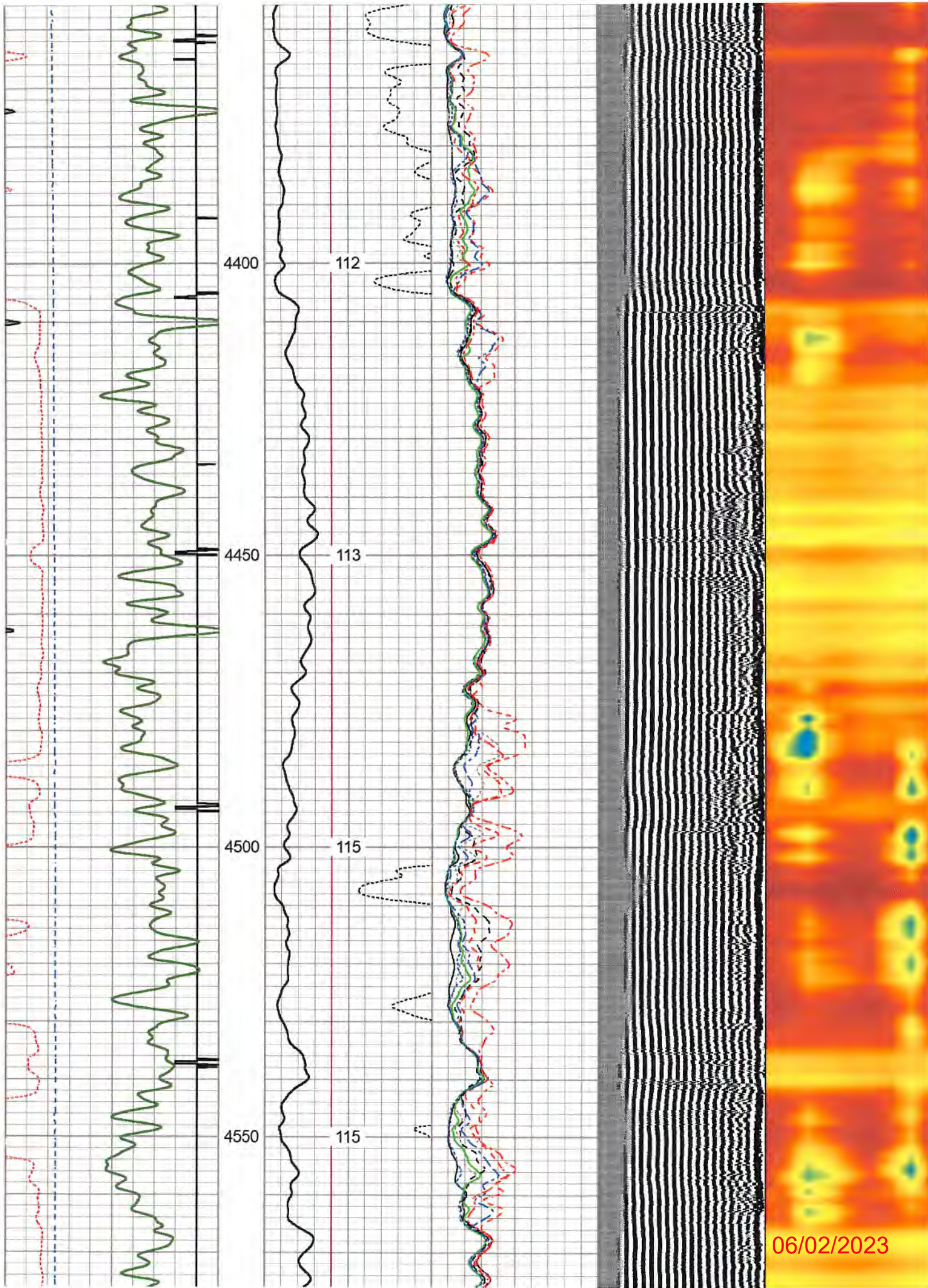
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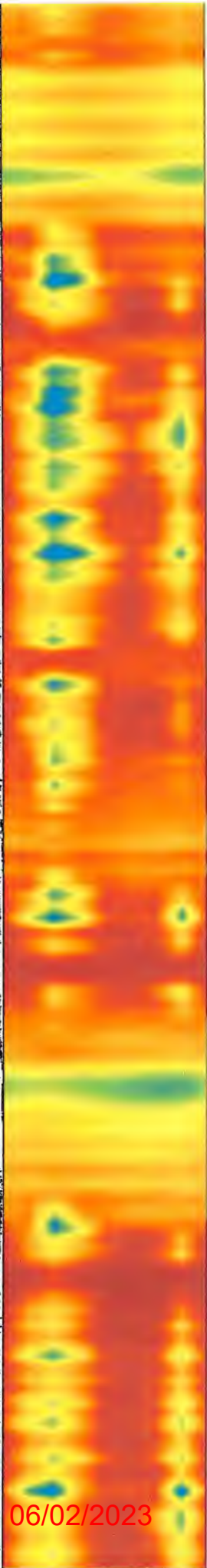
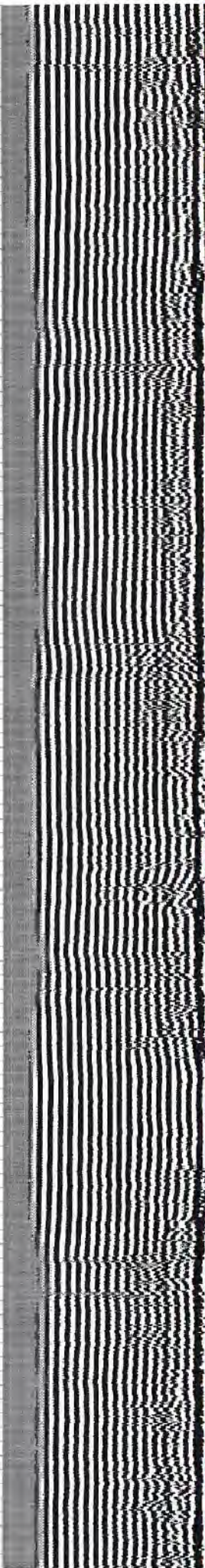
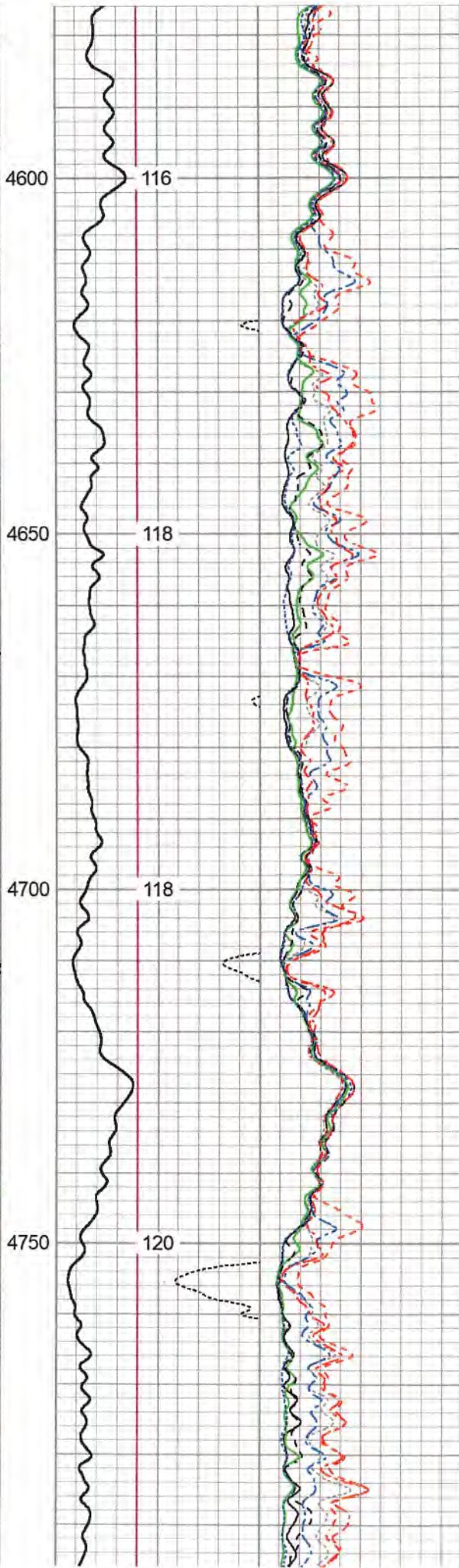
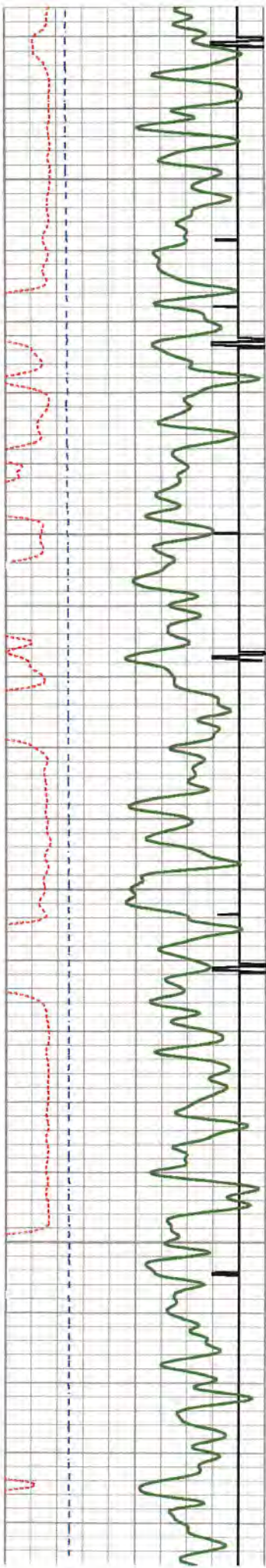
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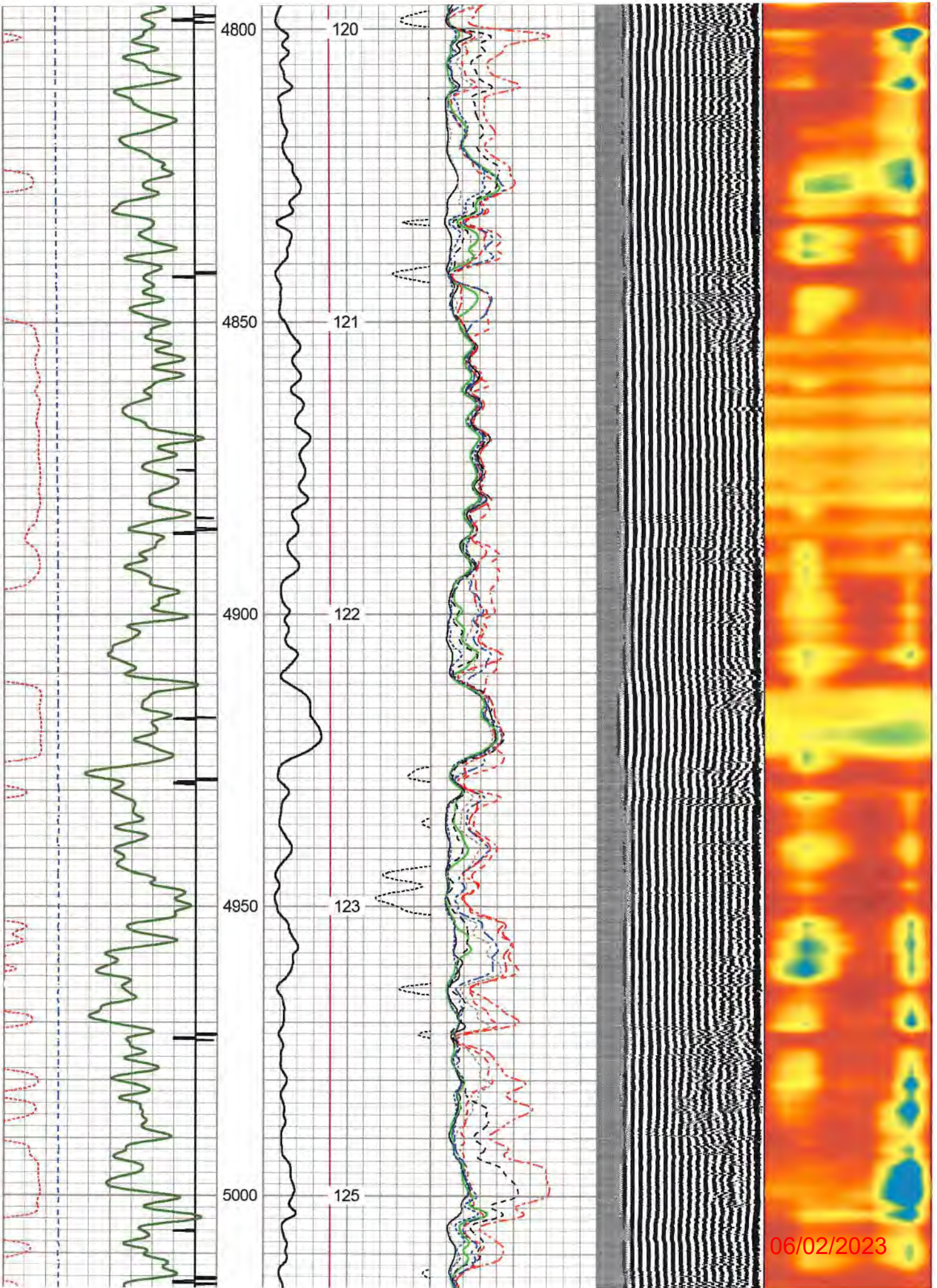
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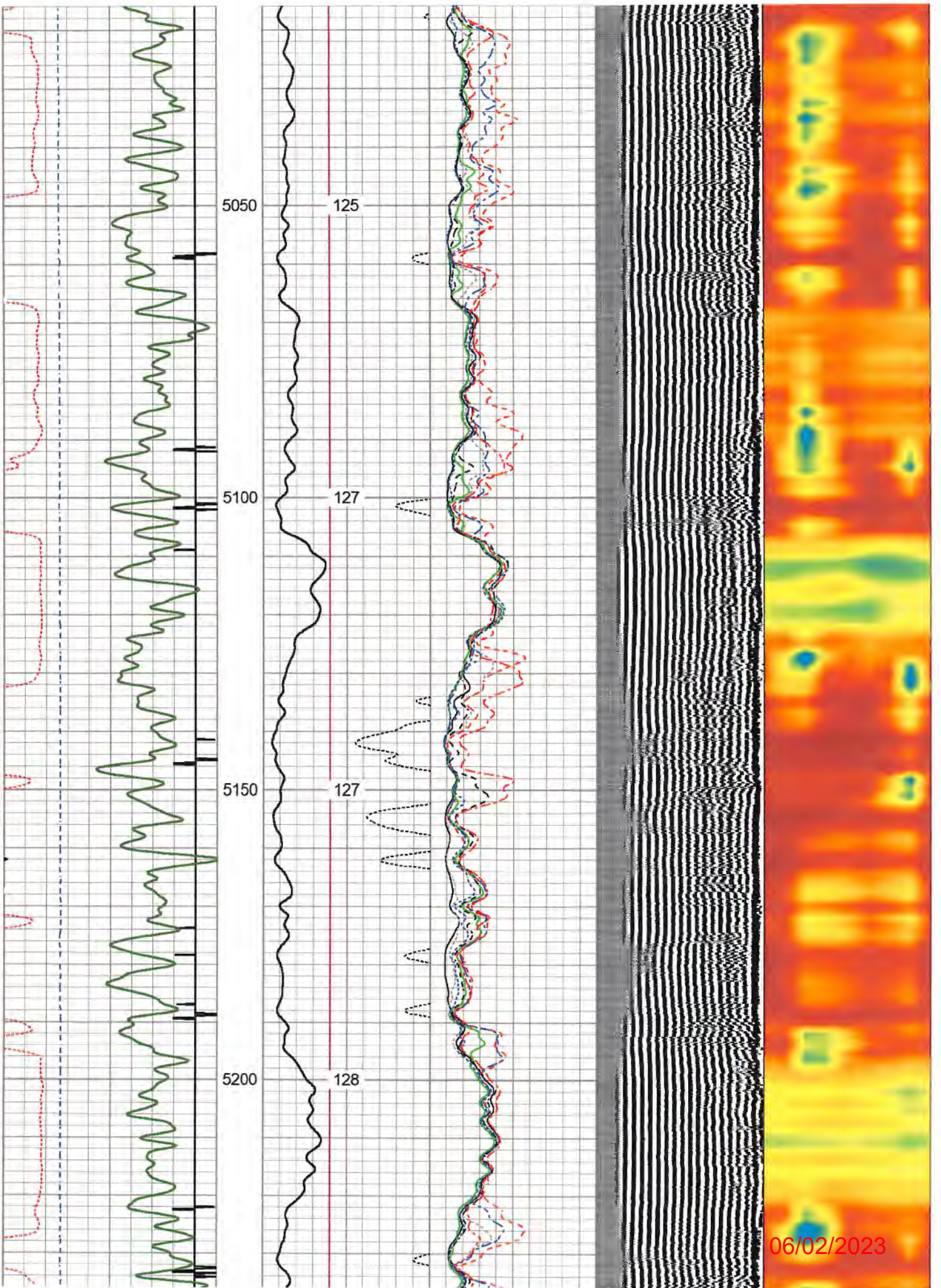




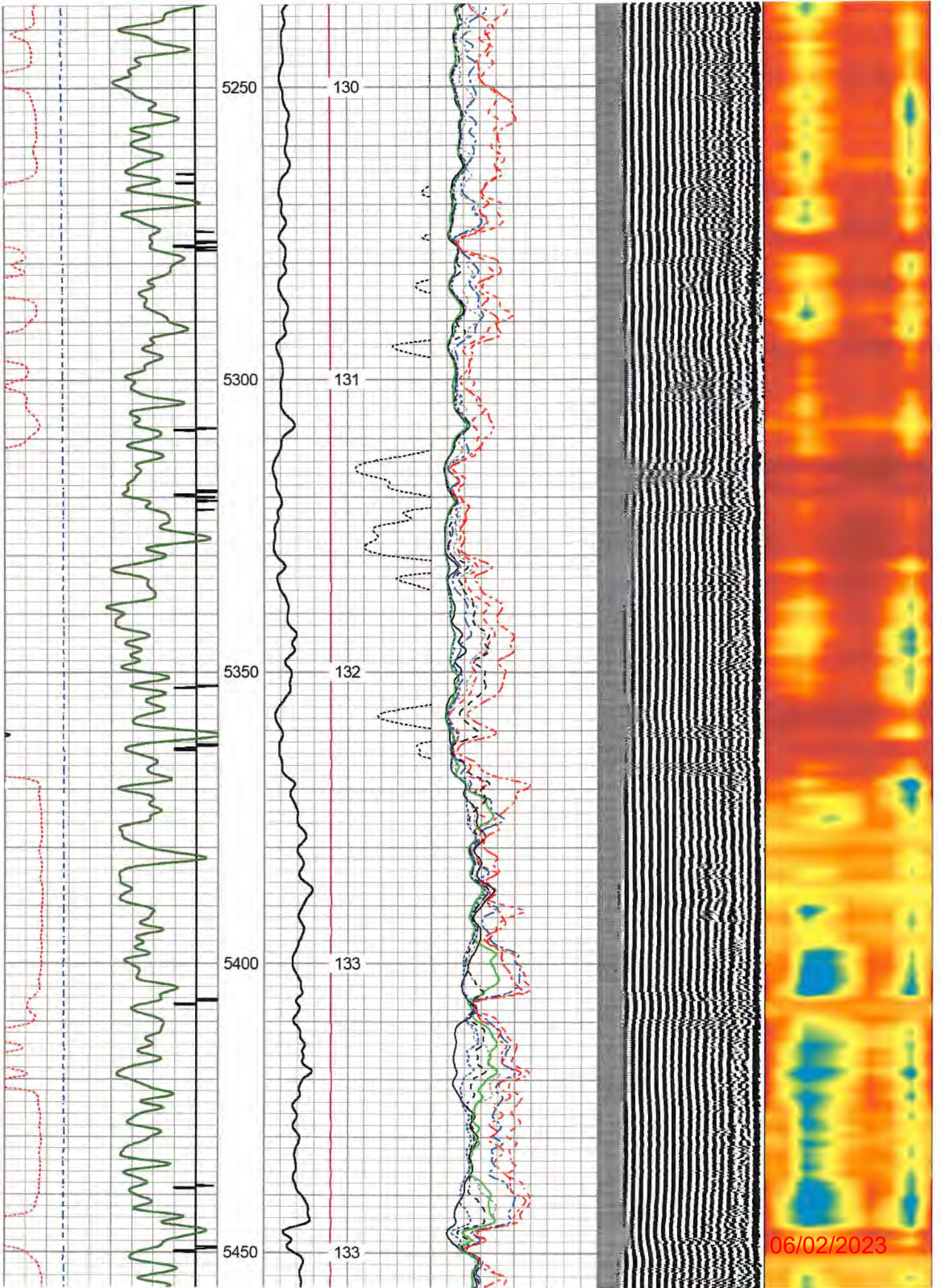
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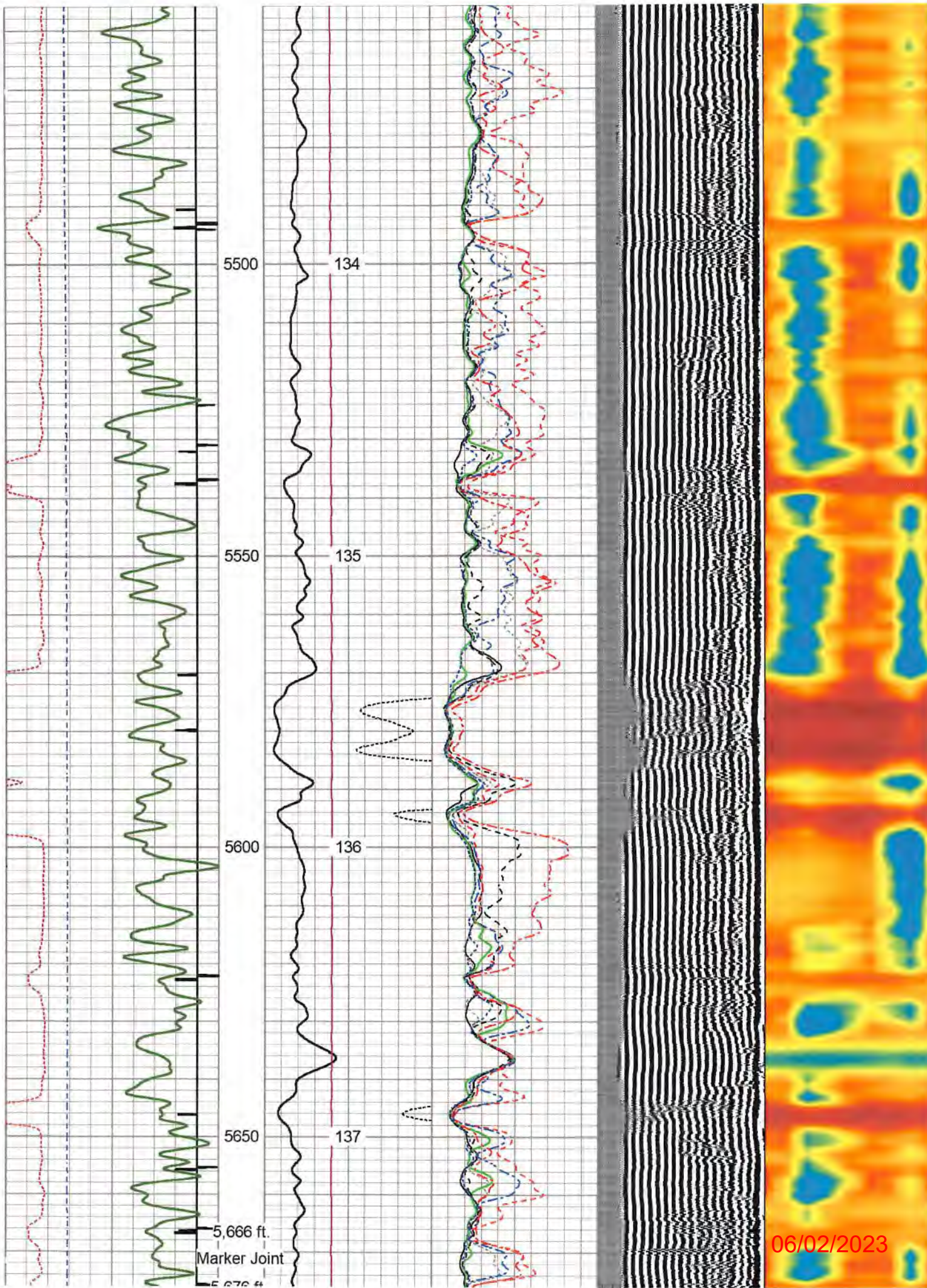
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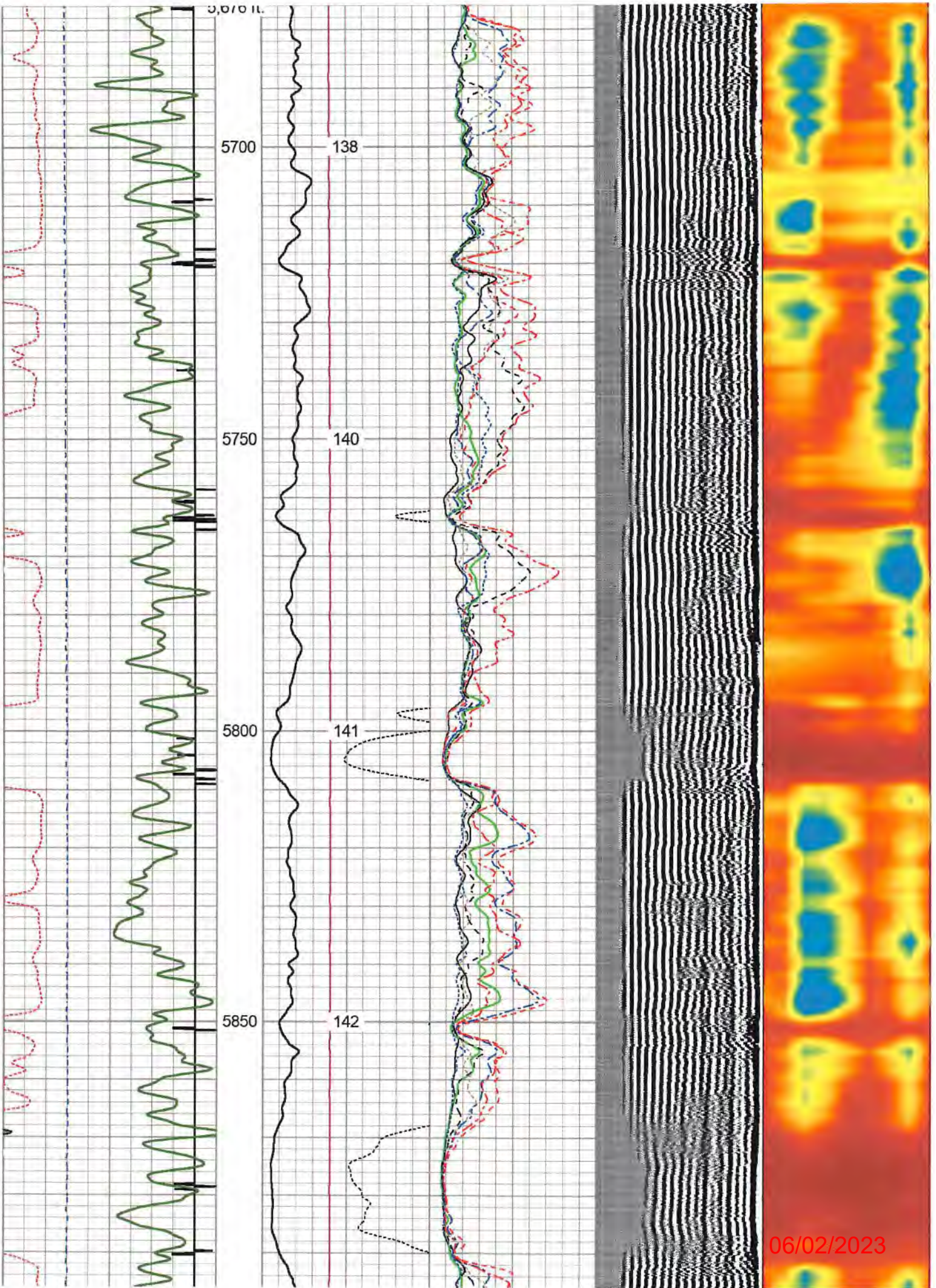


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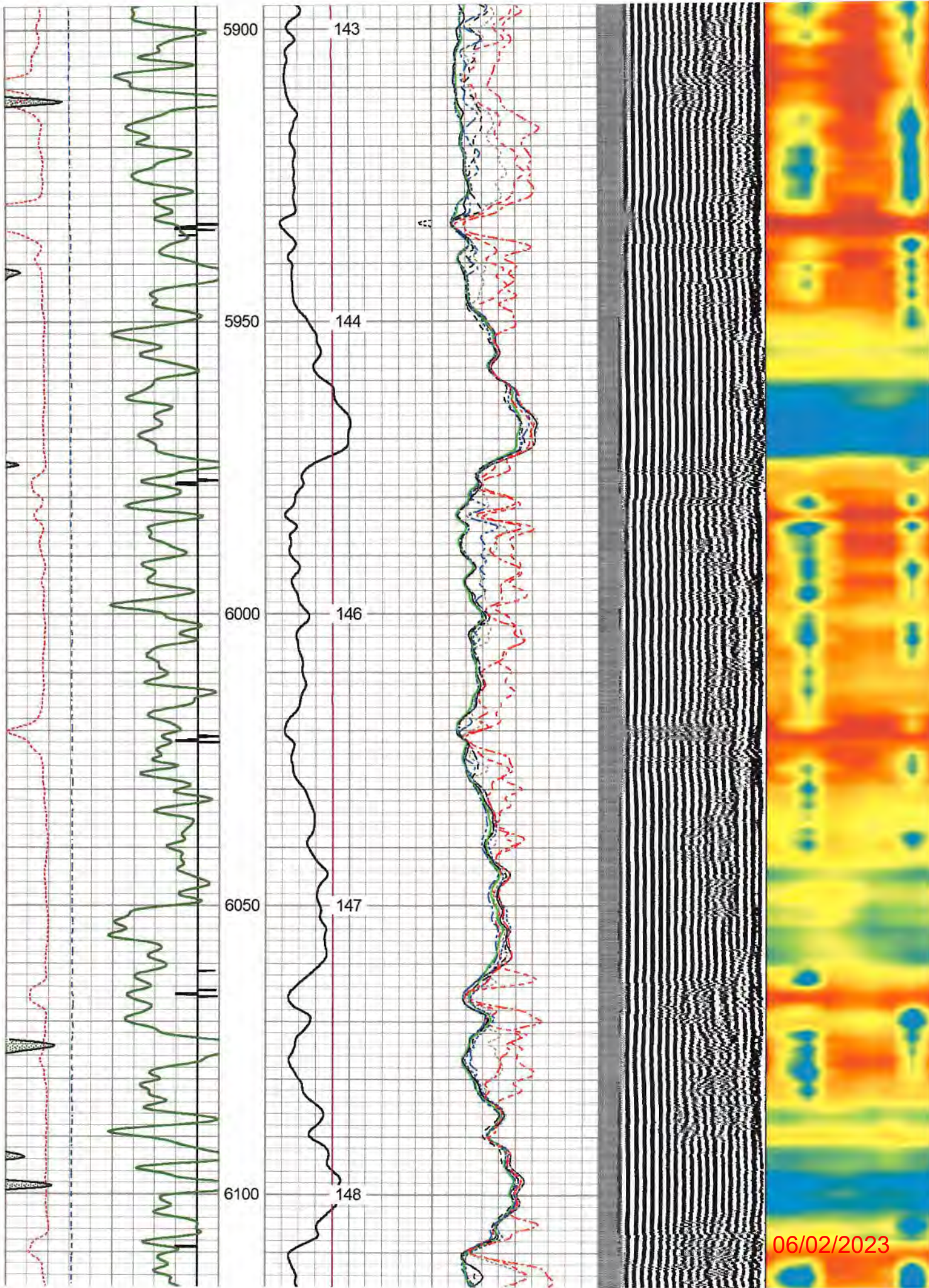


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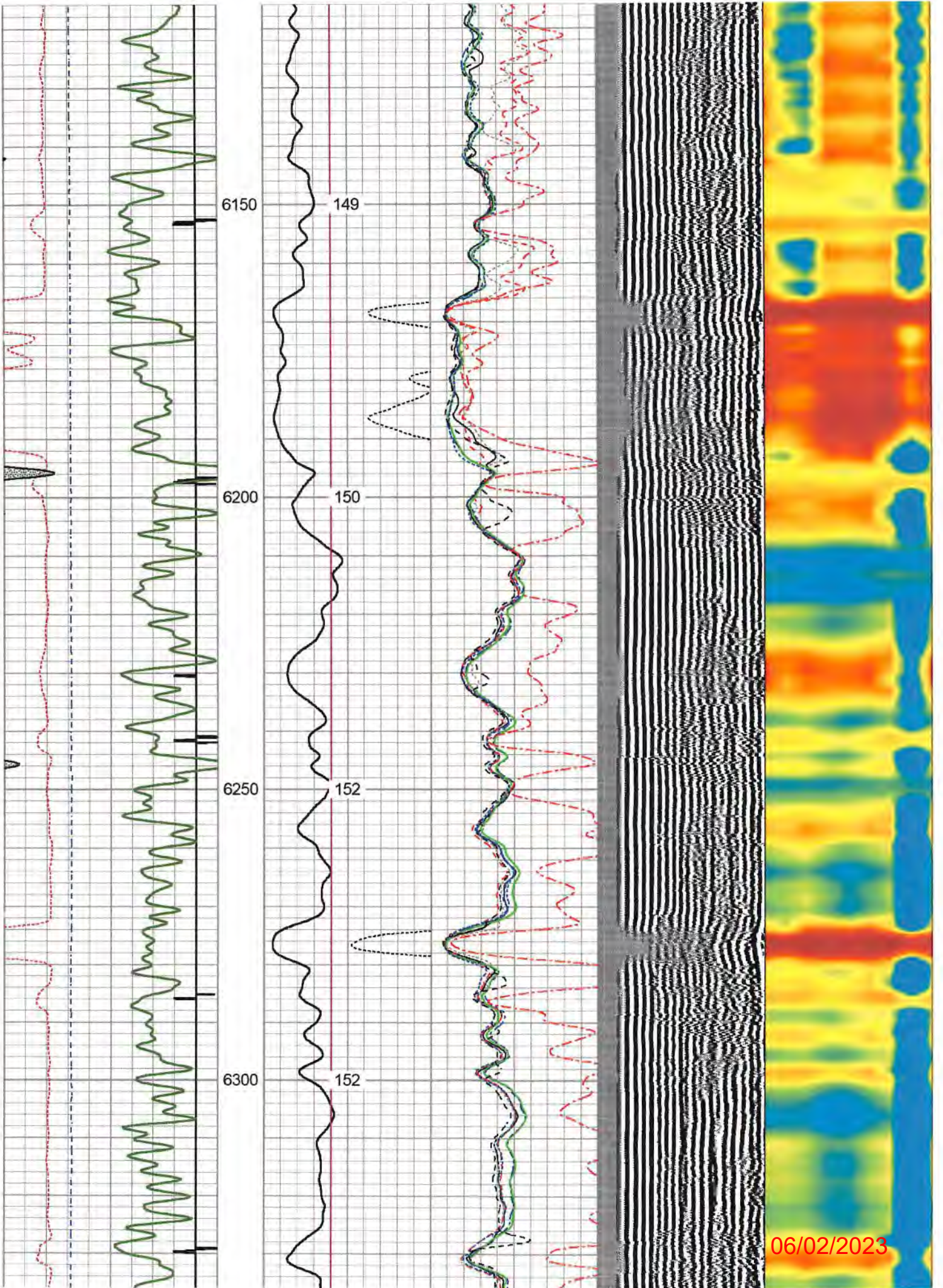


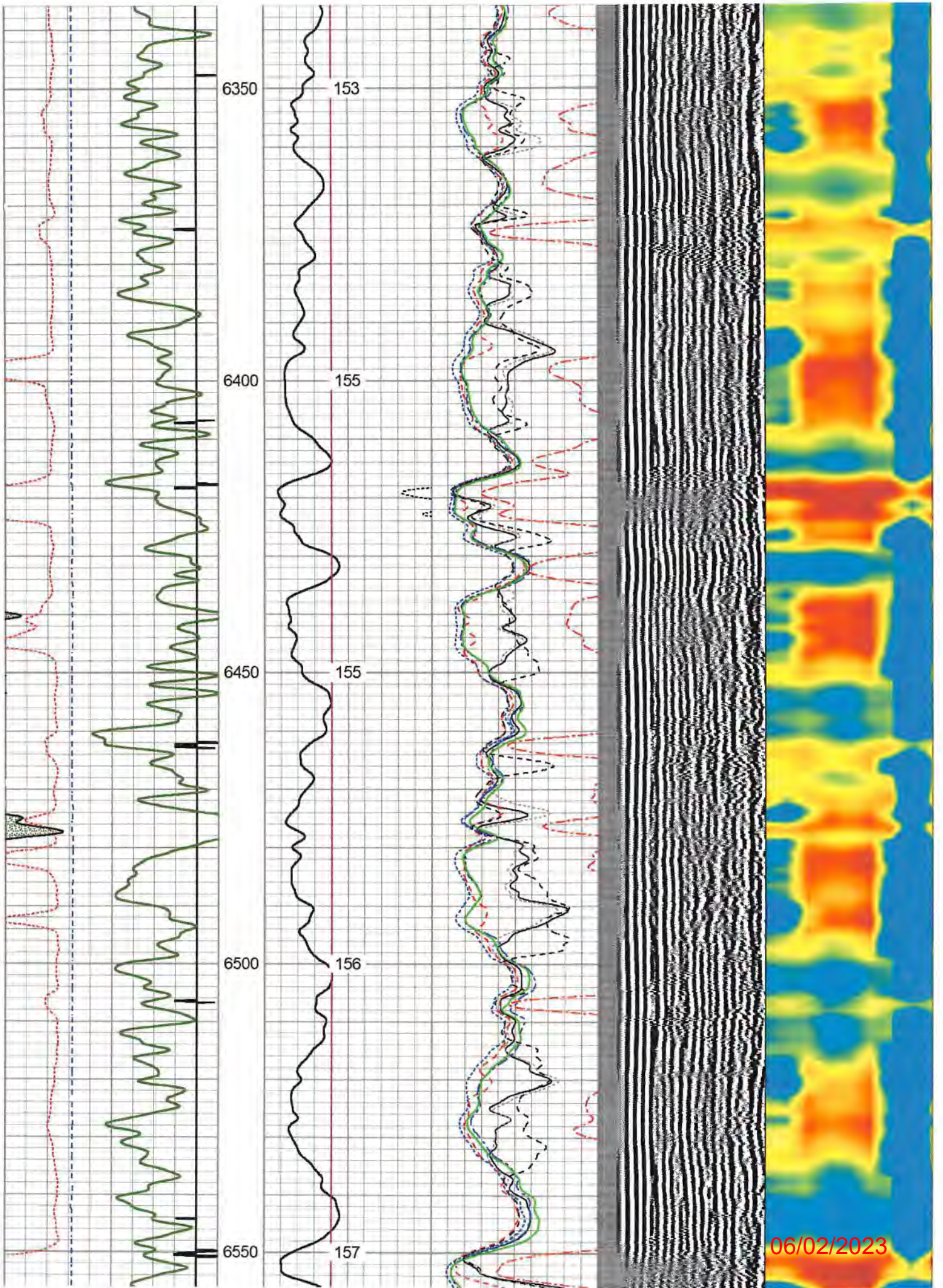


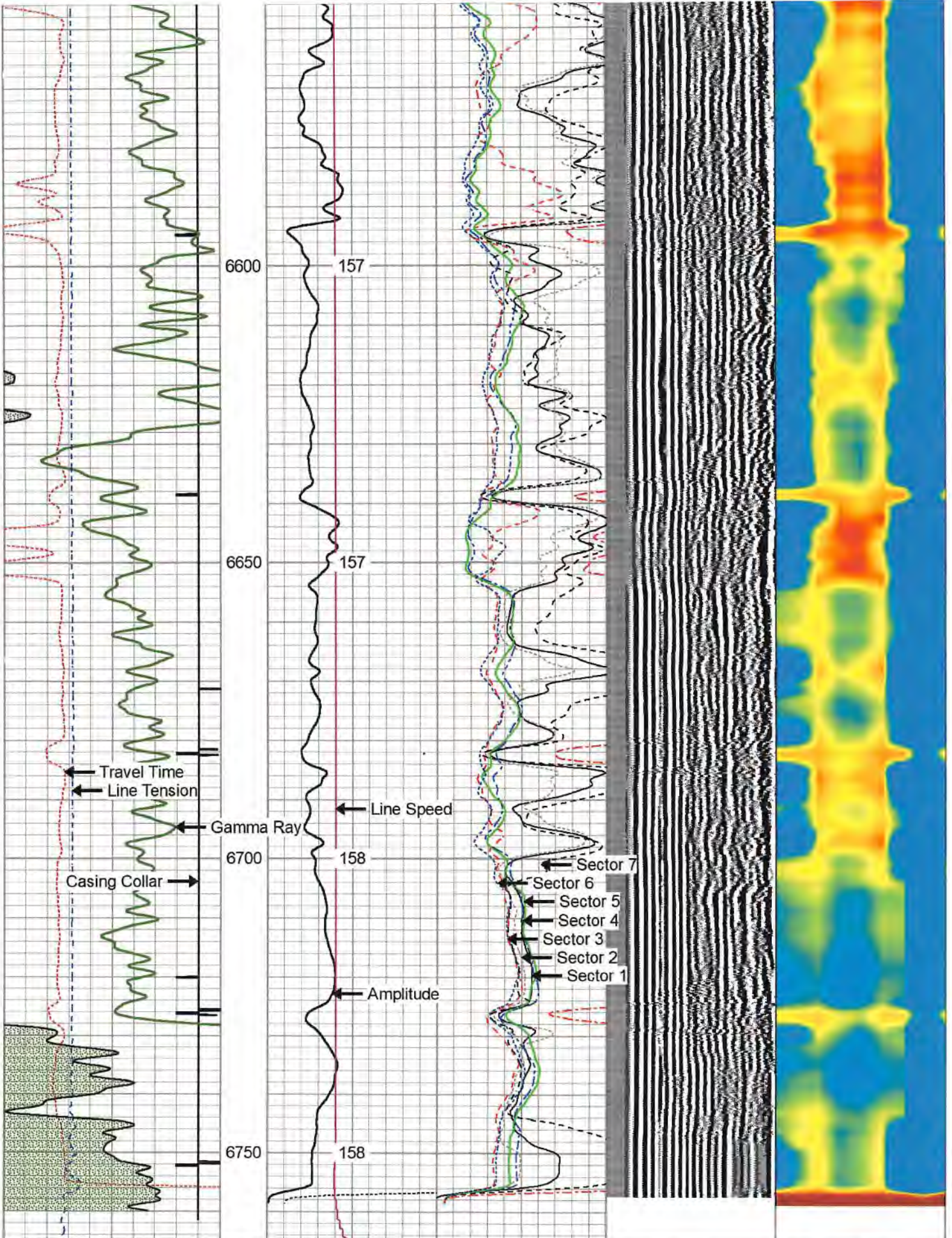
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270	Travel Time (usec)	200
9	Casing Collar	-1

0	Amplitude (mV)	100	-5	Sector 1	150
	Amplified Amplitude		-5	Sector 2	150

Variable Density	200	(usec)	1200
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0 Gamma Ray (GAPI) 150
 0 Line Tension (lb) 5000

0 (mV) 10	-5 Sector 3	150
Line Speed	-5 Sector 4	150
-500 (ft/min) 500	-5 Sector 5	150
TEMP	-5 Sector 6	150
(degF)	-5 Sector 7	150
	-5 Sector 8	150



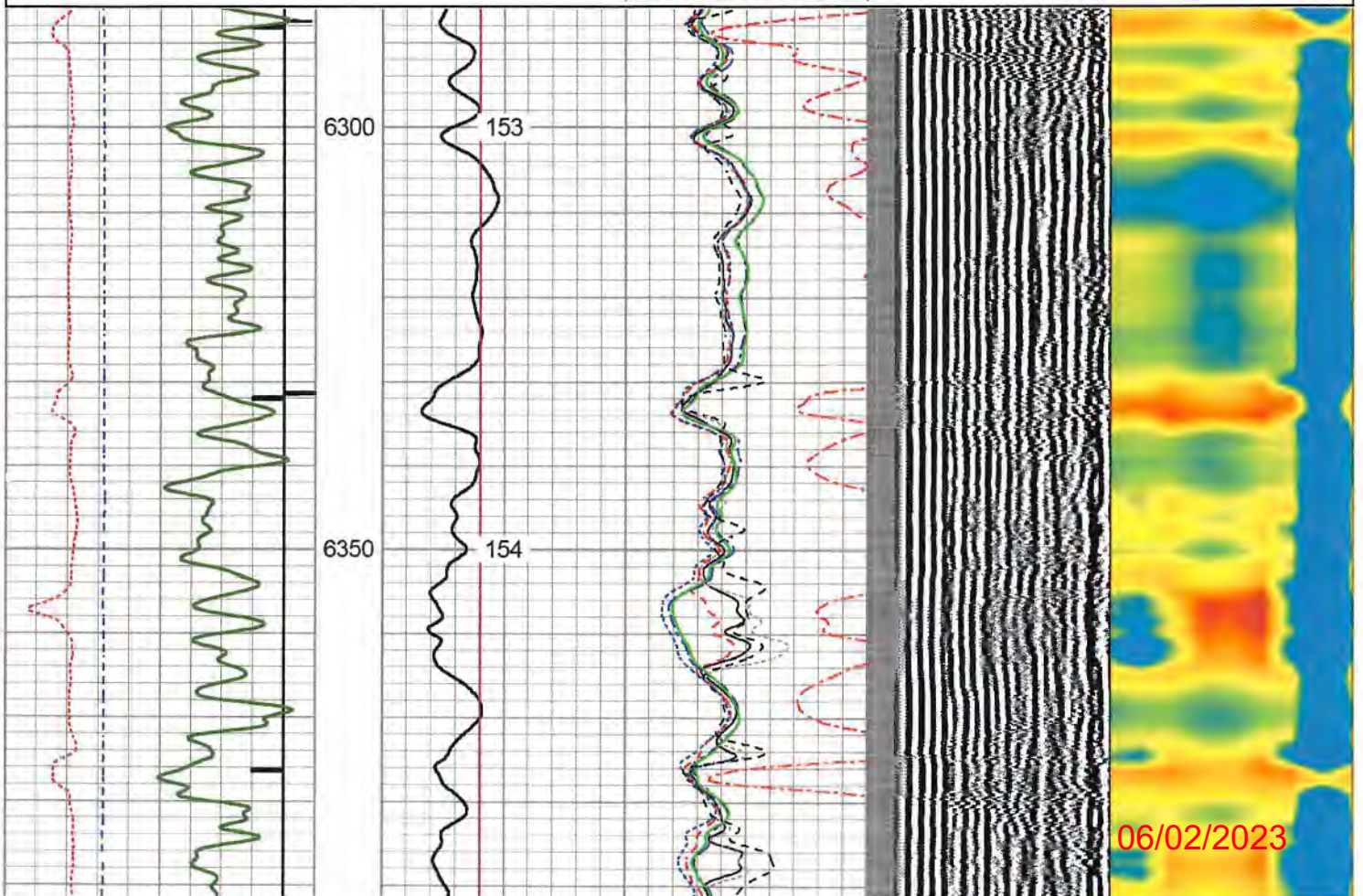
Repeat Pass 0 PSI

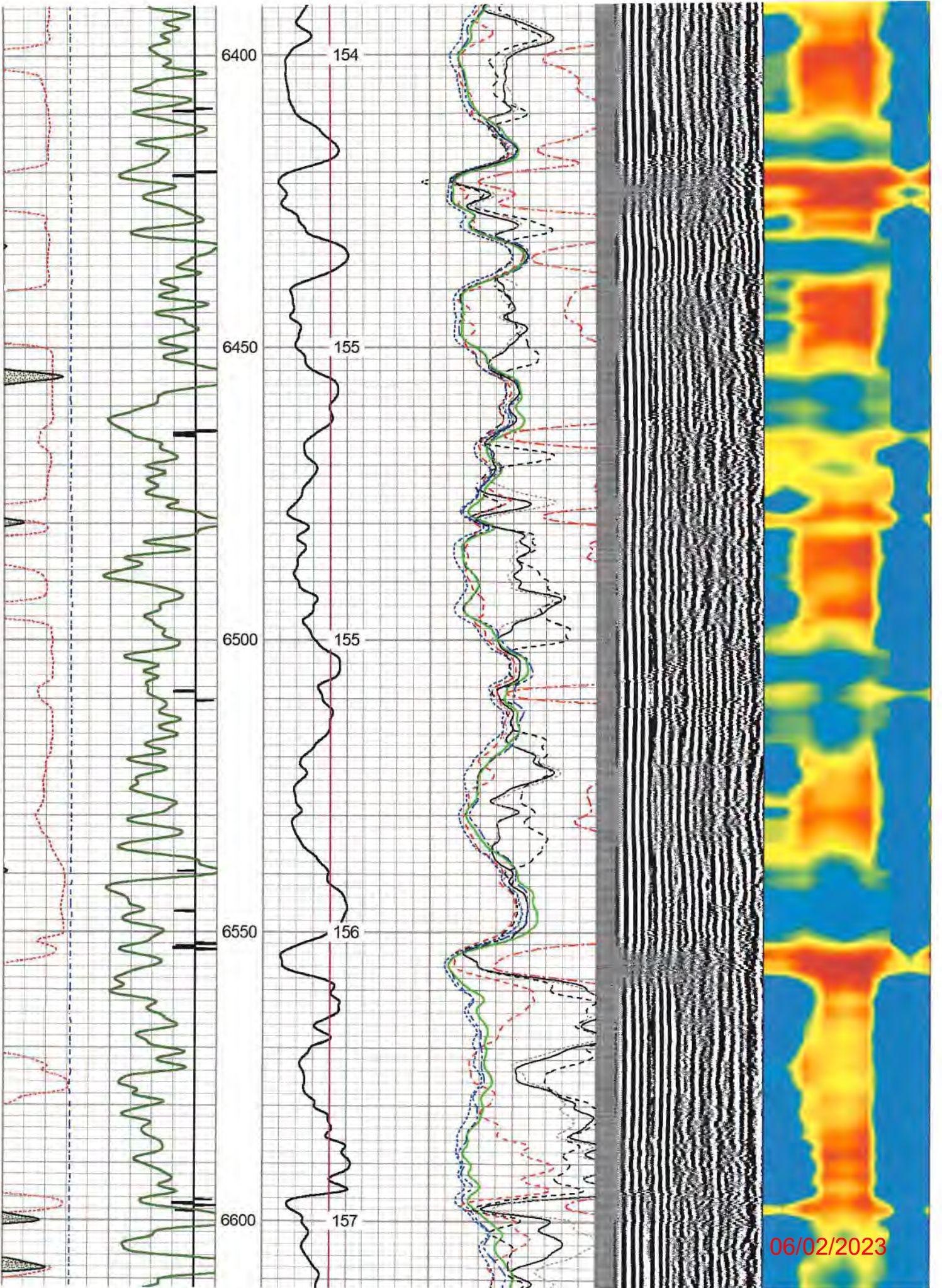
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 Dataset Pathname Rabbit_Ears/Harpua_2H/RCBL_1/pass3
 Presentation Format 9rcbl
 Dataset Creation Sat May 02 11:02:39 2020
 Charted by Depth in Feet scaled 1:240

270 Travel Time (usec) 200
 9 Casing Collar -1
 0 Gamma Ray (GAPI) 150
 0 Line Tension (lb) 5000

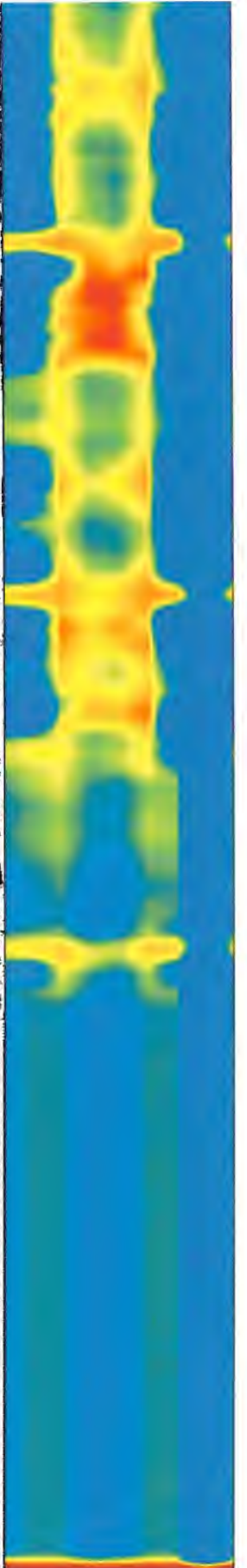
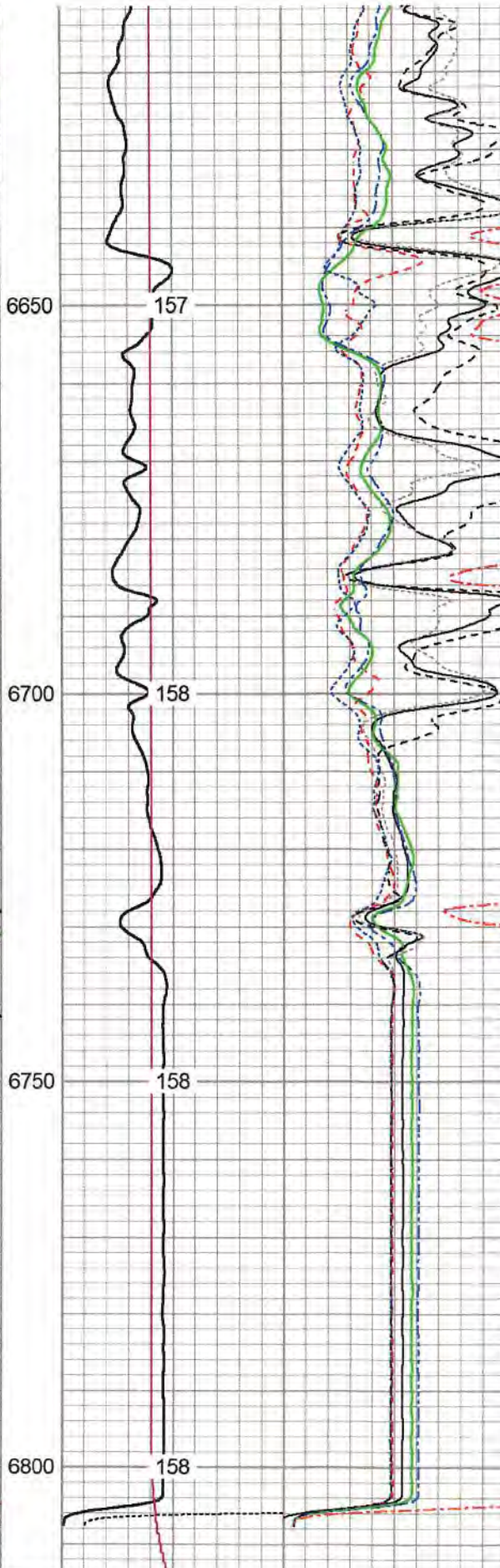
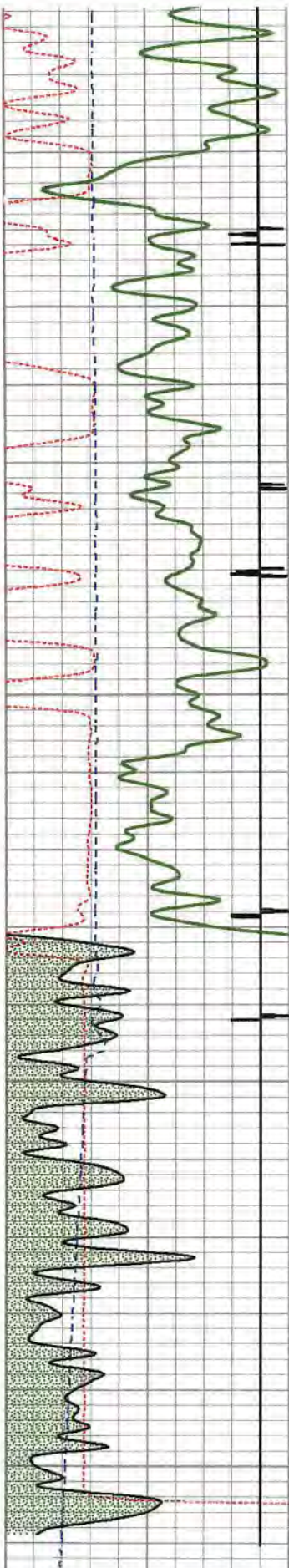
0 Amplitude (mV) 100	-5 Sector 1	150
Amplified Amplitude	-5 Sector 2	150
0 (mV) 10	-5 Sector 3	150
Line Speed	-5 Sector 4	150
-500 (ft/min) 500	-5 Sector 5	150
TEMP	-5 Sector 6	150
(degF)	-5 Sector 7	150
	-5 Sector 8	150

Variable Density 1 Cement Map 8
 200 (usec) 1200





06/02/2023



270	Travel Time (usec)	200
9	Casing Collar	-1
0	Gamma Ray (GAPI)	150
0	Line Tension (lb)	5000

0	Amplitude (mV)	100	-5	Sector 1	150
	Amplified Amplitude		-5	Sector 2	150
0	(mV)	10	-5	Sector 3	150
	Line Speed		-5	Sector 4	150

Variable Density	200	(usec)	1200
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1	Cement Map	8
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06/02/2023

	-500	(ft/min)	500	-5	Sector 5	150
		TEMP		-5	Sector 6	150
		(degF)		-5	Sector 7	150
				-5	Sector 8	150

Log Variables DatabaseC:\ProgramData\Warrior\Data\antero_gamehengeeast_harpua2h_rcbl_nineenergy_may_2020.db
Dataset Rabbit_Ears/Harpua_2H/RCBL_1/pass5.5/_vars_

Top - Bottom

BHTEMP_Src	BOREID	BOTTEMP	CASEOD	CASETHCK	CASEWGHT	MAXAMPL	MINAMPL
TEMP	in	degF	in	in	lb/ft	mV	mV
	7.875	150	5.5	0.415	23	72	3.4
MINATTN	PERFS	PPT	SRFTEMP	TDEPTH			
db/ft		usec	degF	ft			
9.6	No	0	0	0			

Variable Description

BHTEMP_Src : BHTEMP Input Source Selector	MINAMPL : Minimum Amplitude
BOREID : Borehole I.D.	MINATTN : Minimum Attenuation
BOTTEMP : Bottom Hole Temperature	PERFS : Perforation Flag
CASEOD : Casing O.D.	PPT : Predicted Pipe Time
CASETHCK : Casing Thickness	SRFTEMP : Surface Temperature
CASEWGHT : Casing Weight	TDEPTH : Total Depth
MAXAMPL : Maximum Amplitude	

Calibration Report

Database File antero_gamehengeeast_harpua2h_rcbl_nineenergy_may_2_2020.db
Dataset Pathname Rabbit_Ears/Harpua_2H/RCBL_1/pass5.5
Dataset Creation Sat May 02 12:29:41 2020

Gamma Ray Calibration Report

Serial Number:	FW1211-86	
Tool Model:	Probe	
Performed:	Thu Dec 19 22:27:19 2019	
Calibrator Value:	1.0	GAPI
Background Reading:	0.0	cps
Calibrator Reading:	1.0	cps
Sensitivity:	0.8000	GAPI/cps

Segmented Cement Bond Log Calibration Report

Serial Number:	FW1312-32	
Tool Model:	Probe275T	
Calibration Casing Diameter:	5.500	in
Calibration Depth:	1577.008	ft

Master Calibration, performed Sat May 02 10:43:29 2020:

	Raw (v)		Calibrated (mv)		Results	
	Zero	Cal	Zero	Cal	Gain	Offset
3'	0.016	0.477	3.400	71.921	125.679	1.008

06/02/2023

CAL	1.011	1.005				
5'	0.015	0.445	3.400	71.921	159.453	1.006
SUM						
S1	0.050	0.491	3.400	100.000	219.137	-7.648
S2	0.009	0.460	3.400	100.000	214.109	1.568
S3	0.007	0.464	3.400	100.000	211.060	2.022
S4	0.006	0.477	3.400	100.000	205.028	2.111
S5	0.006	0.493	3.400	100.000	198.228	2.289
S6	0.007	0.493	3.400	100.000	198.392	2.104
S7	0.005	0.479	3.400	100.000	203.698	2.348
S8	0.008	0.467	3.400	100.000	210.314	1.700

Internal Reference Calibration, performed (Not Performed):

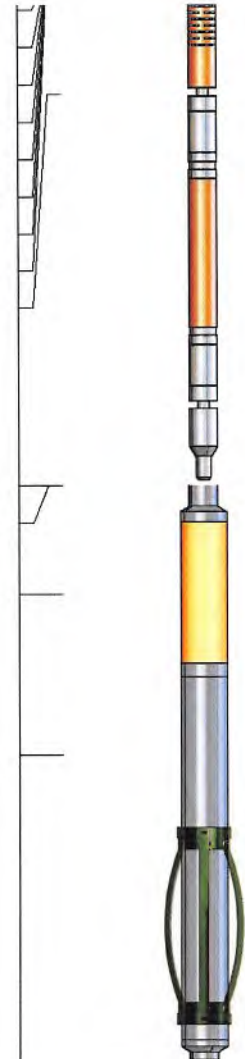
	Raw (v)		Calibrated (v)		Results	
	Zero	Cal	Zero	Cal	Gain	Offset
CAL	0.000	0.000	1.011	1.005	1.000	0.000

Air Zero Calibration, performed Sat May 02 08:40:59 2020:

	Raw (v)		Calibrated (v)		Results	
	Zero		Zero		Offset	
3'	0.000		0.000		0.000	
5'	0.000		0.000		0.000	
SUM						
S1	0.000		0.000		0.000	
S2	0.000		0.000		0.000	
S3	0.000		0.000		0.000	
S4	0.000		0.000		0.000	
S5	0.000		0.000		0.000	
S6	0.000		0.000		0.000	
S7	0.000		0.000		0.000	
S8	0.000		0.000		0.000	

Sensor	Offset (ft)	Schematic	Description	Length (ft)	O.D. (in)	Weight (lb)
			CHD-Titan Titan 1 7/16" GO Cablehead	1.00	1.44	5.00
			CENT-Overbody Antelope (SP-919-0233)	1.67	4.88	5.00
Temp	11.27		RBT-Probe275T (FW1312-32) Probe 2.75" Radial with Integral Temperature Sub	9.39	2.75	90.00
WVFS8	9.03					

06/02/2023

WVFS7	9.03				
WVFS6	9.03				
WVFS5	9.03				
WVFS4	9.03				
WVFS3	9.03				
WVFS2	9.03				
WVFS1	9.03				
WVF3FT	9.03				
WVF5FT	8.03				
HeadVolt	4.78				
WVFCAL	4.78				
CCL	3.88				
GR	2.54	GR-Probe (FW1211-86) Probe 2 3/4" Logging Gamma Ray	4.78	2.75	57.00
		CENT-Overbody Antelope (SP-919-0233)	1.67	4.88	5.00

Dataset: antero_gamehengeeast_harpua2h_rcbl_nineenergy_may_2_2020.db: Rabbit_Ears/Harpua_2H/RCBL_1/pass5.5
Total length: 15.17 ft
Total weight: 162.00 lb
O.D.: 4.88 in

	Company	Antero Resources
	Well	Harpua 2H
	Field	Rabbit Ears
	County	Tyler
	State	West Virginia